Cisco EnergyWise Configuration Guide

EnergyWise Phase 2
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Preface

Audience

This guide is for the networking professional managing the Cisco network devices.

The term *switch* refers to Catalyst switches and other Cisco network devices, such as routers and access points.

Purpose

This document describes how to configure Cisco EnergyWise in your network.

This guide does not describe how to install your network device. For information, see the hardware installation guide for your device.

For information about the Cisco IOS Release 12.2 commands, see the Cisco IOS documentation set on Cisco.com.

This guide does not provide detailed information on the GUIs for the embedded device manager or for Cisco Network Assistant (hereafter referred to as *Network Assistant)* that you can use to manage the switch. However, the concepts in this guide are applicable for the GUI user. For information about the device manager, see the switch online help. For information about Network Assistant, see *Getting Started with Cisco Network Assistant*, available on Cisco.com.

This document does not provide specific information for the management application programming interface (API)- and end-point software development kit (SDK). For information, see the *Cisco EnergyWise Documentation Roadmap*, *Cisco EnergyWise Partner Development Guide, Cisco EnergyWise Programmer Reference Guide for the Management API*, and the *Cisco EnergyWise Programmer Reference Guide for the End Point SDK* on the Cisco Developer Network: http://developer.cisco.com/web/esdk/home.

For documentation updates, see the release notes for this release.

Conventions

This publication uses these conventions to convey instructions and information:

For command descriptions

- Commands and keywords are in **boldface** text.
- Arguments for which you supply values are in *italic*.

- Square brackets ([ ]) mean optional elements.
- Braces ({ }) group required choices, and vertical bars (|) separate the alternative elements.
- Braces and vertical bars within square brackets ([{ | }]) mean a required choice within an optional element.

For interactive examples

- Terminal sessions and system displays are in `screen` font.
- Information that you enter is in **`boldface screen`** font.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and warnings use these conventions and symbols:

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Related Publications

For information about the Cisco network devices, see

- *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* on Cisco.com
- *Configuring Cisco EnergyWise Feature for Branch Routers*: http://www.cisco.com/en/US/docs/routers/access/1900/software/configuration/guide/enrgyz_artg.html
- Documentation for the software release running on your device on Cisco.com: http://www.cisco.com/cisco/web/support/index.html.

Note Before installing, configuring, or upgrading the switch, router, or other Cisco device, see these documents:

- For initial configuration information, see the "Using Express Setup" section in the getting started guide or the "Configuring the Switch with the CLI-Based Setup Program" appendix in the hardware installation guide.
- For device manager requirements, see the "System Requirements" section in the release notes (not orderable but available on Cisco.com).
- For Network Assistant requirements, see the *Getting Started with Cisco Network Assistant* (not orderable but available on Cisco.com).
- For cluster requirements, see the *Release Notes for Cisco Network Assistant* (not orderable but available on Cisco.com).
- For upgrading information, see the "Downloading Software" section in the release notes.

For information about the Cisco EnergyWise partner documentation, go to the Cisco Developer Network:
http://developer.cisco.com/web/esdk/home.

- *Cisco EnergyWise Documentation Roadmap*
- *Cisco EnergyWise Partner Development Guide*
- *Cisco EnergyWise Programmer Reference Guide for the End Point SDK*
- *Cisco EnergyWise Programmer Reference Guide for the Management API*
- *Cisco IOS Release Notes for the Cisco EnergyWise Configuration Guide, EnergyWise Phase 2*

Obtaining Documentation and Support on the Cisco Developer Network

Cisco EnergyWise development partners can access the EnergyWise documents, API and SDK software code, and Cisco IOS software by joining the Cisco Developer Network: http://developer.cisco.com/web/esdk/home.

You need a support contract and license to access EnergyWise resources on the Cisco Developer Network and on TAC. The business development manager who registered your licence must set up your Cisco.com account with the appropriate access privileges.

The forum, wiki, and other resources on the Cisco Developer Network provide a self-help knowledge base and community for EnergyWise application developers and programmers. You can get additional support by opening a case in the TAC Service Request Tool: http://tools.cisco.com/ServiceRequestTool/create/launch.do.

Obtaining Documentation, Support, and Security Guidelines

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation: http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed, and set content to be delivered directly to your desktop by a reader application. The RSS feeds are a free service, and Cisco supports RSS version 2.0.

CHAPTER 1

Managing Single Entities

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Note If your switch is stacking-capable (for example, a Catalyst 3750-X, 3750-E, or 3750 switch), unless otherwise noted, the term *switch* refers to a standalone switch and to a switch stack.

For a list of Cisco network devices supporting Cisco EnergyWise, see the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* on Cisco.com.

For Cisco Integrated Service Routers Generation 2 (ISR G2), see the *Configuring Cisco EnergyWise Feature for Branch Routers*:
http://www.cisco.com/en/US/docs/routers/access/1900/software/configuration/guide/enrgyz_artg.html

See Cisco EnergyWise information:
http://www.cisco.com/en/US/products/ps10195/tsd_products_support_series_home.html.

See EnergyWise partner information on the Cisco Developer Network:
http://developer.cisco.com/web/esdk/home.

Warning **Voice over IP (VoIP) service and the emergency calling service do not function if power fails or is disrupted. After power is restored, you might have to reset or reconfigure equipment to regain access to VoIP and the emergency calling service. In the USA, this emergency number is 911. You need to be aware of the emergency number in your country.**

For information about this warning, see the "Important Notice" appendix.

Overview

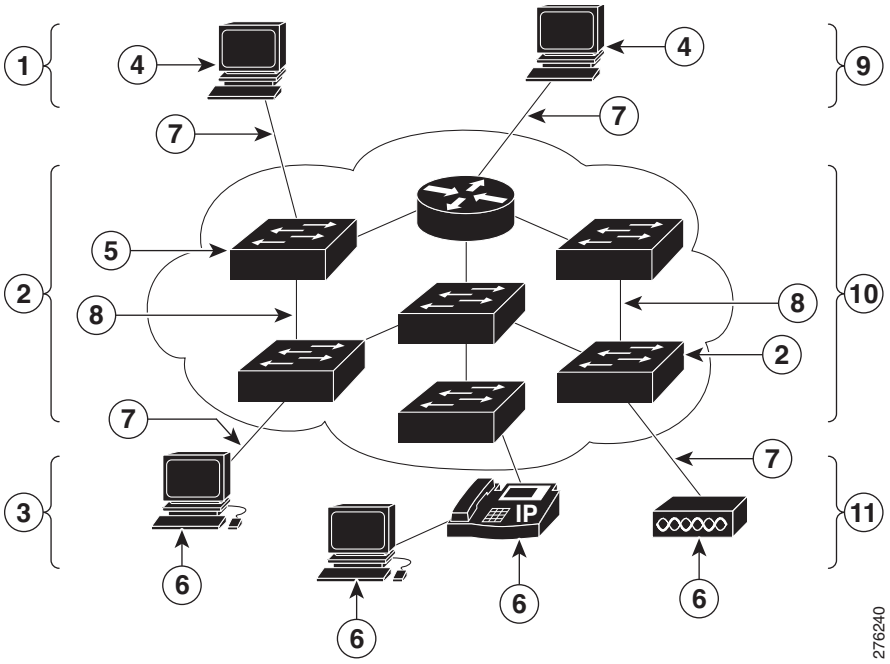
In a Cisco EnergyWise network, EnergyWise monitors and manages the power usage of powered devices: Cisco devices in a *domain* and all the connected *end points*.

An end point can be a device connected to the network, such as an IP phone, access point, or PC.

An *entity* refers to a *domain member* or an end point.

You can configure policies, referred to as recurring events or recurrences, to use time-of-day settings to automatically manage power usage.

Figure 1-1 EnergyWise Network



1	Network management stations	**7**	TCP
2	Domain members	**8**	UDP
3	End points	**9**	Runs queries and sets EnergyWise attributes
4	Management station	**10**	Runs, forwards, and responds to queries
5	Domain member	**11**	Responds to queries
6	End point		

- Management stations—Control applications and devices that use EnergyWise to monitor and manage the power usage of domain members and end points. Management stations also send queries.

  Use the *management application programming interface (API)* to write a power management application.

- Domain members—Cisco switches, routers, and network devices that use power. They forward messages across an EnergyWise *domain* consisting of other Cisco devices and end points. They also forward and reply to queries from the management station and other domain members and aggregate power-usage information from the end points.

  A domain is treated as one unit of power management and is similar to a network-management community.

- End points—Devices that use power. They only respond to queries.

  Use the *end-point software development kit (SDK)* to implement an agent or client that participates as an EnergyWise end point.

Domain members and end points can receive power from an AC power source, a DC power source, or a power supply.

Power over Ethernet (PoE) domain members and end points can also receive power from PoE switches or Cisco EtherSwitch service modules. For example, IP phones and access points connected to a PoE switch receive power from the switch.

Creating an EnergyWise Domain

An EnergyWise domain is treated as one unit of power management and is similar to a network-management community (for example, a VLAN Trunking Protocol [VTP] domain). An EnergyWise domain consists of Cisco domain members and end points. The domain members forward messages to other members and to end points.

For example, if you have a building with a core router, 10 access switches, and 400 end points, such as phones, access points, and PCs running the end point SDK, you can create an EnergyWise domain called *MyBuilding* with the router and switches as domain members.

Note If you want to implement power management applications on a management station and EnergyWise agents on the end points, the domain members must all run EnergyWise Phase 2 or later.

After you enable and configure EnergyWise on the core router and access switches, the *MyBuilding* domain configures itself. Neighbor relationships are set among the domain members.

- Domain members use CDP when it is enabled or EnergyWise UDP messages to automatically discover neighbors.
- You can manually configure static neighbors,

Each domain member sets up a parent-child relationship with an attached end point. The child is one of the 400 end points, and the parent is the domain member. For example, an IP phone (child) is connected to a PoE switch (parent), or a PC is connected to a router.

The EnergyWise domain can also have end points running custom SDK agents.

After the domain is set, a domain member can forward queries and control messages to other domain members and endpoints.

You can

- Use SNMP or a management station to query every entity (domain member or end point).
- Run an EnergyWise query to receive or set power usage information.
- Use a management application, server, or CLI of a domain member to define power usage policies or receive power usage information.

Power Levels

The devices in an EnergyWise network are from different manufacturers. To manage power usage consistently, EnergyWise uses a set of power levels.

If a domain member sends an end point a request to change the power level, the end point determines the appropriate action.

Table 1-1 Power Levels

Category	Level	Description
Operational	10	Full
	9	High
	8	Reduced
Standby	7	Medium
	6	Frugal
	5	Low
	4	Ready
	3	Standby
Nonoperational	2	Sleep
	1	Hibernate
	0	Shut off

The range is from 0 to 10.

The default is 10.

A Cisco switch does not support level 0. You cannot turn off the power on a switch.

A PoE end point, such as IP phone, receives power from a PoE switch port.

- The power level is for the port.
- The port supports levels 0 to 10.
- If the port power level is 0, the port is powered off.
- If the power level is from 1 to 10, the port is on.

Attributes

Table 1-2 Keywords, Name, and Role

	Definition	Defaults
Keywords	Device description (other than the name or role) for which query results are filtered	None.
Name	Device identity for which query results are filtered	For a PoE port, the short version of the port name. For example, Gi0.2 for Gigabit Ethernet 0/2. For a switch, the hostname. For an end point, see the documentation for the end point and the agent or client running on it. We recommend that you use the hostname.
Role	Device function based on the business or deployment context	For a PoE port, the default is *interface*. For a switch, the default can be the model number or the supervisor model number. For an end point, see the documentation for the end point and the agent or client running on it.

Recurring Event

You can configure the switch to power an end point or interface on and off based on the time or date.

A recurring event, also referred to as a recurrence, uses the switch time.

The settings are only in the running configuration.

If the switch fails and then restarts, it uses the power level in the saved configuration.

Secure Domain Communication

Configure the security mode and password, referred to as the *shared secret*, to prevent replay attacks. You set either a strong password with Network Time Protocol (NTP) or a strong password without NTP.

When you use NTP to synchronize the time among domain members and you set a shared secret with NTP, EnergyWise uses the current time with the shared secret to enhance prevention of replay attacks.

MIBs

EnergyWise switches support the CISCO-ENERGYWISE-MIB.

For information, see the *Release Notes for Cisco EnergyWise, EnergyWise Phase 2* on Cisco.com and go to http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml and click **SNMP v2 MIBs** or **SNMP v3 MIBs**.

You can also use FTP to access the MIB files.

Step 1 Make sure that your FTP client is in passive mode.

Note Some FTP clients do not support passive mode.

Step 2 Use FTP to access the server **ftp.cisco.com**.

Step 3 Log in with the username **anonymous**.

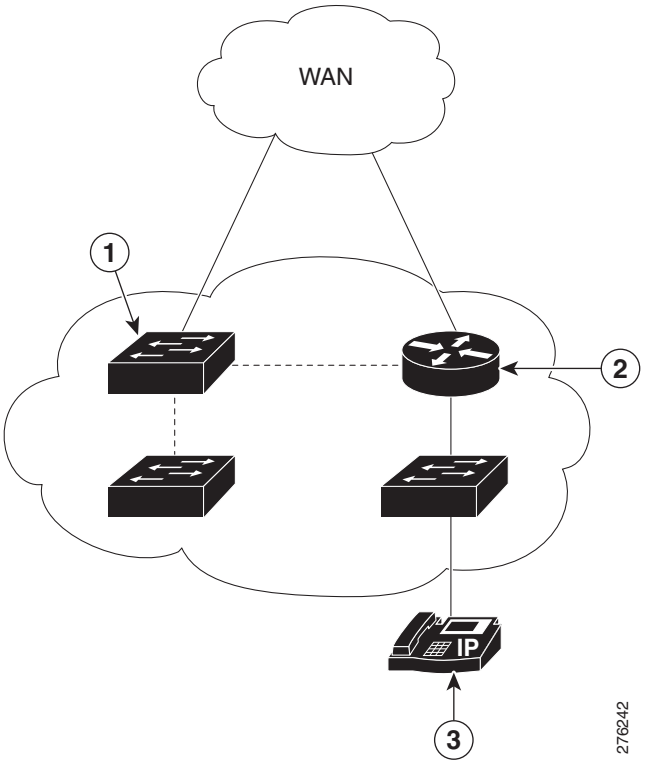
Step 4 Enter your e-mail username when prompted for the password.

Step 5 At the `ftp>` prompt, change directory to **/pub/mibs/v2** or to **/pub/mibs/v3**.

Step 6 Use the **get** *MIB_filename* command to obtain a copy of the file.

Switch Connected to an IP Phone

Figure 1-2 Switch and IP Phone Scenario

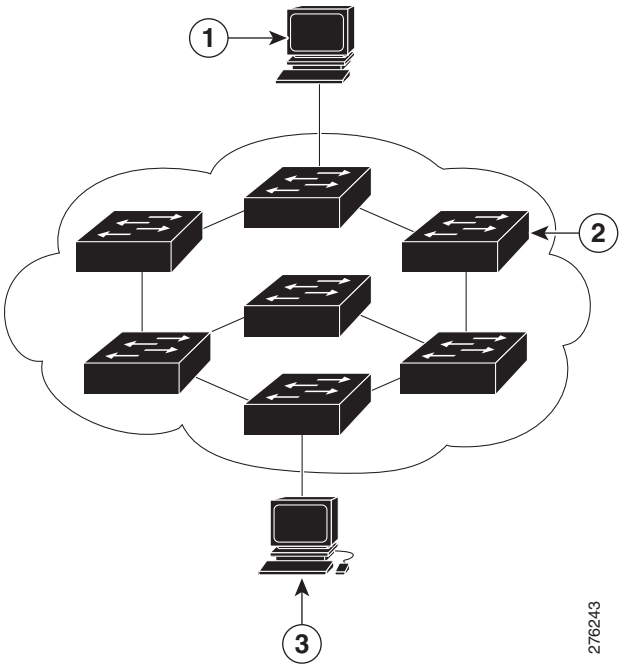


1	Management station	**3**	End point
2	Domain member		

The switch sends the end point a recurring event to power on at 0700 and to power off at 1900.

Switch Connected to a PC

Figure 1-3 Switch and PC Scenario



1	Management station	**3**	End point
2	Domain member		

The switch sends the end point a recurring event to power on at 0600 and to power off at 2200.

Configuration Guidelines

By default, EnergyWise is disabled on the switch.

If you enter the **no energywise level** command, the switch does not immediately change the power level to the default. The power level changes when the switch restarts or when you enter the **energywise level** *level* command.

For a switch with PoE ports, such as a PoE-capable switch:

- When you add the switch to a domain, EnergyWise is enabled on the switch and all the PoE switch ports.
- Use the **energywise level 0** interface configuration command to power off a PoE port.
- You cannot use the **energywise level 0** global configuration command to power off the switch.

If a port is in the error-disabled state:

- It appears as an EnergyWise entity in the **show** command output and in the *collect* query results. The query results show that the port uses 0 W.
- It does not respond to a *set* query.

For recurring events:

- Specify time in the 24-hour format. For example, to set 0634
  - As a specific time, enter the **energywise level** *level* **recurrence importance** *importance* **at 34 6 * * *** interface configuration command.
  - In a time range, enter the **absolute start 06:34 * * 2009** and the **periodic daily 06:34** time-range configuration commands.
- The time zone is based on the end point.
  - If EnergyWise is not running on the end point (for example, a PoE end point), the specified time is based on the switch time zone.
  - If an agent or client is running on the end point, the specified time is based on the end-point time zone.
- If you configure the switch to power on an end point or a PoE port at a specific time, it powers on within 1 minute, for example, between 0700 and 0701.
- If you configure the same recurring event for multiple end points, they all power on within 1 minute.

Note See the *Release Notes for Cisco EnergyWise, EnergyWise Phase 2* on Cisco.com for software releases with Cisco EnergyWise Phase 2.

- When you use the *day_of_month* and the *day_of_week* in the **energywise level** *level* **recurrence importance** *importance* **at** *minute hour day_of_month month day_of_week* interface configuration command in an EnergyWise Phase 2 software release:
  - The recurring event occurs when either the *day_of_month* or the *day_of_week* occurs first in releases earlier than the EnergyWise Phase 2 releases.

    If you specify both the *day_of_month* and the *day_of_week*, the event occurs when either the *day_of_month* or the *day_of_week* is first.

    If you specify the *day_of_month* and use a wildcard (*) for the *day_of_week*, the event occurs on the *day_of_month.*

If you use a wildcard for the *day_of_month* and specify the *day_of_week*, the event occurs on the *day_of_week*.

If you use wildcards for both the *day_of_month* and the *day_of_week*, the event occurs on any day.

  - After you upgrade the software to an EnergyWise Phase 2 release or later, a configured recurring event might occur less frequently than before the upgrade. Reconfigure the event.

- If you use the **energywise level** *level* **recurrence importance** *importance* **at** *minute hour* **29 2 *** interface configuration command to configure an event on February 29 in an EnergyWise Phase 2 software release:
  - Before you upgrade the software to an EnergyWise Phase 2 release or later, the event occurs every day in February.
  - After you upgrade the software, the event might not occur.

When configuring domains:

- Use a strong password for the domain shared secret.
- You must configure the same security mode, either an Network Time Protocol (NTP) or a non-NTP shared secret, for all the domain members.

You must use a strong password:

- Contains both upper and lower case characters (for example, a–z and A–Z).
- Contains letters, numerals, and punctuation (for example, 0-9 and !@#$%^&*()_+|~ =\`{}[]:";'<>?,./).
- Is at least five alphanumeric characters long.
- Is not a word in any language and is not slang, dialect, or jargon.
- Is not based on personal information, such as the names of family members.

Do not use a weak password:

- Contains fewer than eight characters.
- Is a word found in a dictionary (English or foreign)
- Is any other term that is easily guessed or found in common usage, such as

  The name of family, pet, friend, coworker, or fantasy character.

  A computing term or name, such as a command, site, company, model, or application.

  Is a birthday or another kind of personal information, such as an address or telephone number.

  Is a predictable letter pattern or number pattern, such as aaabbb, qwerty, zyxwvuts, or 123321.

  Any of the previous spelled backwards.

  Any of the previous preceded or followed by a digit, such as secret1 or 1secret.

Using the Call In-Progress Feature

Use this feature, also referred to as *activity check*, to configure the switch to wait until a Cisco IP phone connected to a PoE port is not sending or receiving traffic before powering off the port.

Use the **energywise activitycheck** interface configuration command on these Cisco devices:

- Catalyst 6500 switches (see the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices)
- Catalyst 4500 switches

Note Before powering off a PoE port, Catalyst 6500 and Catalyst 4500 switches use interface statistics to determine when a Cisco IP phone connected to the PoE port is not sending or receiving traffic.

- Catalyst 3750-X, 3750-E, 3750, 3560-X, 3650-E, 3560, and 2960 switches
- Cisco EtherSwitch service modules (NME-16ES-1G, NME-16ES-1G-P, NME-X-23ES-1G, NME-X-23ES-1G-P, NME-XD-24ES-1S-P, NME-XD-48ES-2S-P)
- Cisco enhanced EtherSwitch service modules (SM-D-ES2-48, SM-D-ES3-48-P, SM-D-ES3G-48-P, SM-ES2-16-P, SM-ES2-24, SM-ES2-24-P, SM-ES3-16-P, SM-ES3-24-P, SM-ES3G-16-P, SM-ES3G-24-P)

Before entering the **energywise activitycheck** command on devices other than Catalyst 6500 and 4500 switches, you must enable automatic quality of service (auto-QoS) for VoIP on the port with this configuration:

- All packets from the IP phone have the class of service (CoS) value 5.

  To verify this, use the **show mls qos maps cos-output-q** privileged EXEC command to display the CoS output queue threshold map.

  This example shows that CoS value 5 is mapped to queue 1 and threshold 3 on the Gigabit Ethernet 0/1:

```
Cos-outputq-threshold map:

             cos:  0   1   2   3   4   5   6   7

             ------------------------------------

  queue-threshold: 4-3 4-2 3-3 2-3 3-3 1-3 2-3 2-3
```

  This is the configuration for the PoE port:

```
<output truncated>
interface GigabitEthernet0/1
 srr-queue bandwidth share 10 10 60 20
 queue-set 2
 priority-queue out
 mls qos trust device cisco-phone
 mls qos trust cos
 auto qos voip cisco-phone
 service-policy input AutoQoS-Police-CiscoPhone
<output truncated>
```

- Auto-QoS for VoIP is enabled on the PoE port.
- Auto-QoS is enabled on the IP phone. The switch does not change the CoS value in the packet from the IP phone.

- If the switch is connected to the IP phone through multiple Cisco devices, verify that they trust the CoS value in incoming packets and do not change it.
- After entering the **energywise activitycheck** interface configuration command, verify that the switch powers off the port when a Cisco IP phone connected to it is not sending or receiving traffic. While making a phone call
  - Run a query to set the port power level to 0. The switch should not power off the IP phone.
  - Use the **show mls qos interface statistics** privileged EXEC command to display the port QoS statistics, including the number of packets in queue 1.

PoE and EnergyWise Interactions

Table 1-3 If an Entity Participates in EnergyWise

EnergyWise Entity	PoE Mode		
	auto	never	static
PoE port	Yes	No	Yes
Non-PoE port	No	No	No

If the PoE port mode is **never**, the port power is off, but EnergyWise is not disabled. You can

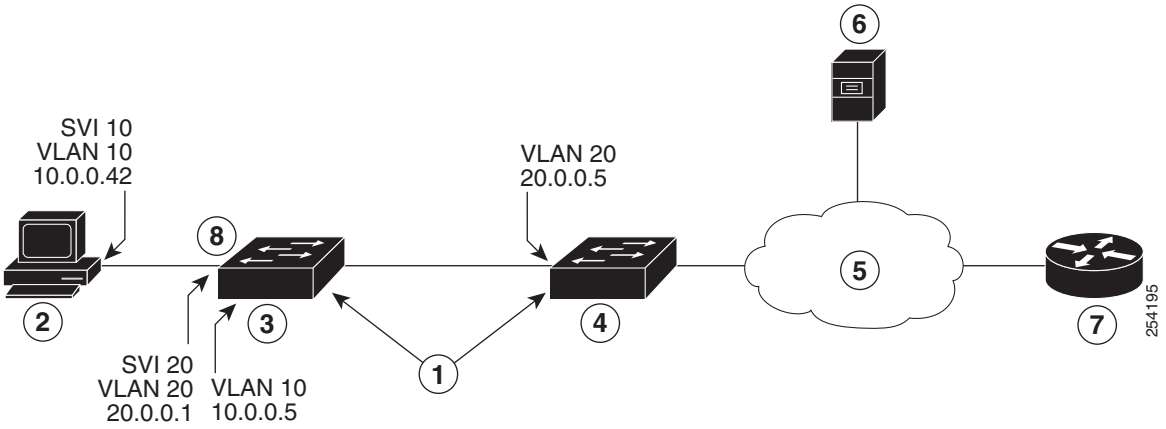
- Configure EnergyWise on the port.
- Configure the port power level. The change takes effect after you change the port mode to **auto** or **static**. You do not need to restart the switch.

If EnergyWise is disabled, the entity can use PoE to manage the port power usage.

Preventing Network Access to a Non-Cisco End Point

We do not recommend using PC clients running EnergyWise Orchestrator as domain members. In an EnergyWise network, non-Cisco endpoints could have access to the connected IP network and the Internet.

Figure 1-4 PC with Access to the EnergyWise Network and the Internet



1	Domain member	**5**	Internet
2	Non-Cisco end point running an EnergyWise agent or client	**6**	DCHP server
3	Layer 2 switch	**7**	Router
4	Layer 3 switch	**8**	Management interface SVI 11

For example, in this network, to receive an IP address from the DHCP server, the PC sends a broadcast message to the switches, which forward the message to the Internet. The DHCP server receives the message and assigns an IP address to the PC.

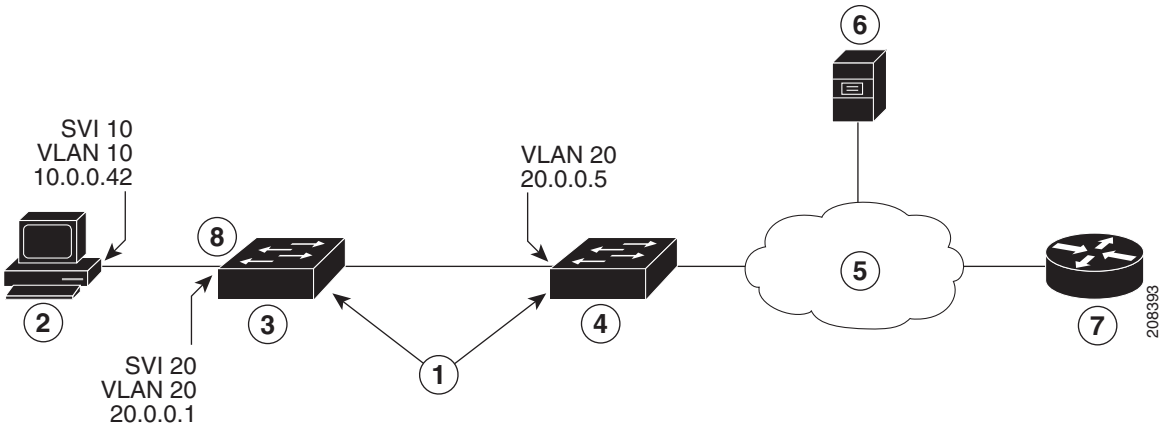
When the PC sends an EnergyWise message to the Layer 2 switch, it forwards the message to the Layer 3 switch instead of responding to it. The Layer 2 switch and the connected PC are in different VLANs. The Layer 3 switch also forwards the message.

If the message is forwarded to the router, the router adds the PC to the router MAC address table as a directly connected device. To prevent this, you can configure a switched virtual interface (SVI) on the Layer 2 switch so that the PC and switch are now in the same VLAN.

The PC now has access to the connected IP network and to the Internet.

- When the PC sends messages to the switch, the switch now responds to the messages instead of forwarding them.
- The PC can also send messages to and receive messages from the IP network.

Figure 1-5 PC without Access to the EnergyWise Network and the Internet



1	Domain member	**5**	Internet
2	Non-Cisco end point running an EnergyWise agent or client	**6**	DCHP server
3	Layer 2 switch	**7**	Router
4	Layer 3 switch	**8**	Interface to which ACL 102 is applied

To prevent the PC from accessing the IP network, create and apply an ACL to the ingress interface on the Layer 2 switch. This ACL permits only traffic sent to an IP address of 255.255.255.255 or 20.0.0.1 and to a UDP port of 43440.

```
Switch(config)# access-list 102 permit udp any any eq 43440
Switch(config)# access-list 102 permit udp any 20.0.0.1 0.0.0.0 eq 43440
Switch(config)# end
Switch# show access-lists
Extended IP access list 102
     10 permit udp any any eq 43440
     20 permit udp any 20.0.0.1 0.0.0.0 eq 43440
```

Note When you are creating an ACL, remember that, by default, the end of the access list contains an implicit deny statement for all packets if it did not find a match before reaching the end.

CLI Compatibility Issues

EnergyWise Phase 2 is not backward-compatible with EnergyWise Phase 1.

Note Catalyst 6500 switches do not support EnergyWise Phase 1.

To display the EnergyWise version running on your switch, use the **show energywise version** privileged EXEC command.

To display the software version running on your switch, use the **show version** privileged EXEC command.

Note If your switch is running EnergyWise Phase 2, enter the **no energywise domain** global configuration command to disable EnergyWise before downgrading your software to a release supporting EnergyWise Phase 1.

If your switch is running EnergyWise Phase 1 and you upgrade your software to a release supporting EnergyWise Phase 2.

- The EnergyWise settings in the running configuration are updated. The switch sets the management password as the same domain password in the **energywise domain** command.

  Enter the **copy running-config startup-config** privileged EXEC command to save the EnergyWise settings in the configuration file.

- For EnergyWise to work properly
  - All domain members must run either

    EnergyWise Phase 1

    EnergyWise Phase 2 or later

    Note To verify the EnergyWise release, use the **show energywise version** privileged EXEC command.
    The EnergyWise release is referred to as the *EnergyWise specification* in the command output.

  - All domain members must have the same domain name and security mode.
  - If your switch is stacking-capable (for example, a Catalyst 3750-X, 3750-E, or 2960-S switch) and is a member of a switch stack, all the stack members must run the same EnergyWise version.

These commands in EnergyWise Phase 1 were modified:

- **energywise domain** *domain-name* **secret** [**0** | **7**] *password* global configuration command

  We recommend that you reconfigure the EnergyWise domain with the **energywise domain** *domain-name* **security** {**ntp-shared-secret** | **shared-secret**} [**0** | **7**] *shared-secret* global configuration command.

  If you do not reconfigure the domain, the switch synchronizes the management password with the the domain password.

- **energywise management** *tcp-port-number* global configuration command

  We recommend that you reconfigure the management password for the domain with the **energywise management security shared-secret** [**0** | **7**] *shared-secret* **port** *tcp-port-number* global configuration command.

For Catalyst 4500-specific issues, see Appendix A, “Cisco EnergyWise and Catalyst 4500 Switches.”

For Catalyst 6500-specific issues, see Appendix B, “Cisco EnergyWise and Catalyst 6500 Switches.”

Manually Managing Power

- Enabling EnergyWise, page 1-17
- Configuring Entity Attributes, page 1-18

- Powering the PoE Port, page 1-20
- Configuring Port Attributes, page 1-20

Enabling EnergyWise

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**service password-encryption**	(Optional) Enables password encryption. If youset a hidden password in Step 3, enter this command.
Step 3	**energywise domain** *domain-name* **security** {**ntp-shared-secret** | **shared-secret**} [**0** | **7**] *domain-password* [**protocol udp port** *udp-port-number* [**interface** *interface-id* | **ip** *ip-address*]]	Enables EnergyWise on the entity, assigns the entity to a domain with the specified *domain-name*, sets the domain security mode, and sets the domain password to authenticate all communication in the domain. • **ntp-shared-secret**—Sets a strong password with NTP. If the time between members varies ±30 seconds, the entity drops events. • **shared-secret**—Sets a strong password without NTP. For information about domain security, see the "Secure Domain Communication" section. • (Optional) **0**—Uses an unencrypted password. This is the default. • (Optional) **7**—Uses a hidden password. If you do not enter **0** or **7**, the default is 0. • (Optional) **port** *udp-port-number*—Specifies the UDP port that communicates with the domain. The range is from 1 to 65000. The default is 43440. • (Optional) **interface** *interface-id*—Specifies the port that communicates with the domain if the IP address is dynamically assigned.We recommend that you specify the *interface-id*. You should use this in a bridged network. • (Optional) **ip** *ip-address*—Specifies the IP address that communicates with the domain if the interface is a switched virtual interface (SVI) and VLAN trunking protocol (VTP) pruning is enabled. You should use this in a routed network. For the *domain-name* and *domain-password* • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
Step 4	**end**	Returns to privileged EXEC mode.

	Command	Purpose
Step 5	**show energywise** **show energywise domain**	Verifies your entries.
Step 6	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Configuring Entity Attributes

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**energywise importance** *importance*	(Optional) Sets the importance. The range is from 1 to 100. The default is 1.
Step 3	**energywise keywords** *word,word,...*	(Optional) Assigns at least one keyword. When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols. By default, keywords are not defined.
Step 4	**service password-encryption**	(Optional) Enables password encryption. If youset a hidden password in Step 5 or Step 10, enter this command.
Step 5	**energywise management security shared-secret** [**0** | **7**] *mgmt-password* [**port** *tcp-port-number*]	(Optional) Sets the management password on the switch that the management station uses to communicate with the domain. • (Optional) **0**—Uses an unencrypted password. • (Optional) **7**—Uses a hidden password. If you do not enter **0** or **7**, the default is 0. • For the *mgmt-password* – You can enter alphanumeric characters and symbols such as #, (, $, !, and &. – Do not enter an asterisk (*) or a blank space between the characters or symbols. • **port** *tcp-port-number*—Specifies the TCP port for management access. The range is from 1025 to 65535. The default is 43440. By default, the management password is not set.

	Command	Purpose
Step 6	**energywise name** *name*	(Optional) Specifies the EnergyWise-specific entity name. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols. The default is the hostname.
Step 7	**energywise neighbor** [*hostname*| *ip-address*] *udp-port-number*	(Optional) Assigns a static neighbor. • (Optional) Domain Name System (DNS) hostname (*hostname*) or IP address (*ip-address*). • UDP port (*udp-port-number*) that sends and receives queries. The range is from 1 to 65000. By default, static neighbors are not assigned.
Step 8	**energywise role** *role*	(Optional) Specifies the role of the entity in the EnergyWise domain. For example, lobby.b20. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols. The default is the model number.
Step 9	**energywise allow query {save | set}**	(Optional) If the switch receives a query from the management station or another domain member, configures the switch to • **save**—Responds to a query to save the running configuration. • **set**—Responds to a query to change the power level or the EnergyWise attributes. By default, the switch responds to the **set** query.
Step 10	**energywise endpoint security {none | shared-secret** [**0** | **7**] *shared-secret*}	(Optional) Sets the security mode for an end point. • **none**—Disables security. • **shared-secret**—Uses a password for secure communication with the domain member. • (Optional) **0**—Uses an unencrypted password. • (Optional) **7**—Uses a hidden password. If you do not enter **0** or **7**, the default is 0. • For the *shared-secret* – You can enter alphanumeric characters and symbols such as #, (, $, !, and &. – Do not enter an asterisk (*) or a blank space between the characters or symbols. By default, the password is not set.
Step 11	**end**	Return to privileged EXEC mode.

	Command	Purpose
Step 12	**show energywise** **show energywise domain**	Verifies your entries.
Step 13	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Powering the PoE Port

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface** *interface-id*	Specifies the port or the range of ports to be configured, and enters interface configuration mode.
Step 3	**energywise level** *level*	Manually powers on the port. • For a connected PoE end point, enter a power level of 10. • For an non- PoE-capable end point, enter a power level from 1 to 10. The end point determines the appropriate action.
Step 4	**end**	Returns to privileged EXEC mode.
Step 5	**show energywise domain** **show energywise children**	Verifies your entries.
Step 6	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file. **Note** The power level that you set in Step 3 is the default power level when the switch restarts.

Configuring Port Attributes

Note The **energywise activitycheck** command is supported on

Catalyst 6500 switches (see the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices)

Catalyst 4500, 3750-X, 3750-E, 3750, 3560-X, 3560-E, 3650, 2960-S and 2960 switches

Cisco EtherSwitch service modules (NME-16ES-1G, NME-16ES-1G-P, NME-X-23ES-1G, NME-X-23ES-1G-P, NME-XD-24ES-1S-P, NME-XD-48ES-2S-P)

Cisco enhanced EtherSwitch service modules (SM-D-ES2-48, SM-D-ES3-48-P, SM-D-ES3G-48-P, SM-ES2-16-P, SM-ES2-24, SM-ES2-24-P, SM-ES3-16-P, SM-ES3-24-P, SM-ES3G-16-P, SM-ES3G-24-P)

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface** *interface-id*	Specifies the port or the range of ports to be configured, and enters interface configuration mode.
Step 3	**energywise importance** *importance*	(Optional) Sets the importance value of the port. The range is from 1 to 100. The default is 1.
Step 4	**energywise keywords** *word,word,...*	(Optional) Assigns at least one keyword for the port. When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols. By default, keywords are not defined.
Step 5	**energywise name** *name*	(Optional) Specifies the EnergyWise-specific port name. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols. The default is a short version of the port name; for example, Gi1.0.2 for Gigabit Ethernet 1/0/2.
Step 6	**energywise role** *role*	(Optional) Specifies the role of the port in the domain. For example, *lobbyport*. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols. By default, the role is *interface*.
Step 7		(Optional) Before entering the **energywise activitycheck** command • Verify that auto-QoS is enabled on the port and on the connected IP phone. • If the switch is connected to the IP phones through multiple Cisco devices, verify that they trust the CoS value in incoming packets. For information about the auto-QoS configuration, see the "Using the Call In-Progress Feature" section in the "Managing Single Entities" chapter. To configure auto-QoS, see the software documentation for your Cisco network device.

	Command	Purpose
Step 8	**energywise activitycheck**	(Optional) Verifies that the connected IP phone is not sending or receiving traffic before the switch powers off the port. **Note** The switch cannot determine if the IP phone is in the hold state. To verify that the command takes effect, see the "Auto-QoS and EnergyWise Interactions" section in the "Managing Single Entities" chapter.
Step 9	**energywise allow query set**	(Optional) If the interface receives a query from the management station or another domain member, configures the interface to respond to a query changing the power level and the EnergyWise attributes. By default, the switch responds to this query.
Step 10	**end**	Returns to privileged EXEC mode.
Step 11	**show running-config**	Verifies your entries.
Step 12	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Configuring Recurring Events

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	**show energywise**	(Optional) Verifies that EnergyWise is enabled.
Step 2	**configure terminal**	Enters global configuration mode.
Step 3	**time-range** *time-range-name*	(Optional) Assigns a name to the time range, and enter time-range configuration mode. If you do not configure a time range, go to Step 6. The time range is based on the system clock. • If EnergyWise is not running on the end point (for example, a PoE end point), the specified times are based on the switch time zone. • If an agent or client is running on the end point, the specified times are based on the end-point time zone. Use the **absolute** and the **periodic** time-range configuration commands to specify times and days for a recurring event. You can use one **absolute** condition and multiple **periodic** conditions. If your **absolute** or **periodic** condition has an end time and day, the switch ignores these values.

	Command	Purpose
Step 4	**absolute start** *hh:mm day_of_month month year*	(Optional) Sets the start time and day for the recurring event. • *hh:mm*—Specifies the time (24-hour format) in hours and minutes. For example, 08:14 for 0814 and 20:55 is 2055. • *day month year*—Specifies the date. – *day_of_month*—The range is from 1 to 31. Use * for the wildcard. – *month*—The range is from January to December. Use * for the wildcard. – *year*—The minimum year is 1993.
Step 5	**periodic** *days_of_the_week hh:mm*	(Optional) Sets the weekly start time and day for the recurring event. • *days_of_the_week*—Valid values are – **Monday**, **Tuesday**, **Wednesday**, **Thursday**, **Friday**, **Saturday**, or **Sunday**—Enter a single day, a range of days with a dash between the starting and ending days, or multiple days separated by a comma – **daily**—Enter if the recurring event starts from Monday to Sunday. – **weekdays**—Enter if the recurring event starts from Monday to Friday. – **weekend**—Enter if the event occurs on Saturday and Sunday. • *hh:mm*—Specifies the time (24-hour format) in hours and minutes. For example, 08:47 for 0847 and 23:05 is 2305.
Step 6	**interface** *interface-id*	Specifies the port or a range of ports to be configured, and enters interface configuration mode.

	Command	Purpose
Step 7	**energywise level** *level* **recurrence importance** *importance* {**at** *minute hour day_of_month month day_of_week* | **time-range** *time-range-name*}	(Optional) Schedules a power-on or power-off event. • **level** *level* —Specifies the power level – To power off the end point, enter **0**. – To power on the end point If it is a PoE end point, enter **10**. If it is another powered device, enter a power level from 1 to 10. The end point determines the appropriate action. • **importance** *importance*—The event occurs if the importance value of the end point is less than or equal to the importance value. The range is from 1 to 100. • **at** *minute hour day_of_month month day_of_week*—Specifies the time (24-hour format) in cron format for the recurring event. – *minute*—The range is from 0 to 59. Use * for the wildcard. – *hour*—The range is from 0 to 23. Use * for the wildcard. – *day_of_month*—The range is from 1 to 31. Use * for the wildcard. – *month*—The range is from 1 (January) to 12 (December). Use * for the wildcard. – *day_of_week*—The range is from 0 (Sunday) to 7 (Sunday). Use * for the wildcard. • **time-range** *time-range-name*—Specifies the time range for the recurring event. The event uses the switch time. Repeat this step to schedule another event.
Step 8	**end**	Returns to privileged EXEC mode.
Step 9	**show energywise recurrence**	Verifies your entries.
Step 10	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Disabling EnergyWise

Table 1-4 EnergyWise Commands

Command	Mode	Purpose
clear energywise neighbors	Privileged EXEC	Deletes the discovered neighbors and end points running agents or clients from the EnergyWise neighbor table. The switch immediately rediscovers them.
no energywise	Interface configuration	Disables EnergyWise on the PoE port or on the end point.
no energywise activitycheck	Interface configuration	Configures the switch to not wait until a Cisco IP phone connected to a PoE port is not sending or receiving traffic before the switch powers off the port.
no energywise allow query save **no energywise allow query set**	Global configuration	Configures the switch to not respond to a query that saves the running configuration. Configures the switch to not respond to a query that changes the power level or the EnergyWise attributes.
no energywise allow query set	Interface configuration	Configures the interface to not respond to a query that changes the power level or the EnergyWise attributes.
no energywise domain	Global configuration	Disables EnergyWise on the domain member.
no energywise endpoint	Global configuration	Configures the switch to not establish parent-child relationships with connected EnergyWise-compatible end points. The end points cannot receive queries or messages from the switch.
no energywise [**importance** | **keywords** [*word*,*word*,...] | **level** | **name** [*name*] | **role** [*role*]]	Interface configuration	Removes the EnergyWise configuration on a switch port. If you enter the **no energywise level** command, the switch does not immediately change the power level to the default. The power level changes when the switch restarts or you enter the **energywise level** *level* command.
no energywise {***importance*** | **keywords** [*word,word,...*] | **name** | **neighbor** [*hostname* | *ip-address*] *udp-port-number* | **role**}	Global configuration	Removes the EnergyWise configuration on the entity.
no energywise level *level* **recurrence importance** *importance* {**at** ***minute hour day_of_month month day_of_week*** | **timerange** *timerange-name*}	Interface configuration	Removes the recurring event configuration on a switch port.
no energywise management	Global configuration	Configures the switch to not communicate with a connected management station that sends queries.

Examples

- Setting the Domain, page 1-26
- Manually Managing Power, page 1-26
- Automatically Managing Power, page 1-27

Note In the examples, the *interface-id* is in this format: *type slot-or-module-number/port-number*; for example, gigabitethernet 0/5. To specify an interface, see your device software documentation.

Setting the Domain

```
Switch# show energywise
Interface   Role              Name                 Usage      Lvl   Imp  Type
---------   ----              ----                 -----      ---   ---  ----
            fanfare           jsmith               1009.0(W)  5     100  paren
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# energywise domain cisco security ntp-shared-secret cisco protocol udp port
43440 ip 2.2.4.30
Switch(config)# energywise importance 50
Switch(config)# energywise keywords lab1,devlab
Switch(config)# energywise name LabSwitch
Switch(config)# energywise neighbor member1 43440
Switch(config)# energywise role role.labaccess
Switch(config)# energywise allow query save
Switch(config)# end
Switch# show energywise domain
Name      : member1
Domain    : cisco
Protocol  : udp
IP        : 2.2.2.21
Port      : 43440
Switch# show energywise neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Id   Neighbor Name               Ip:Port               Prot   Capability
--   -------------               -------               ----   ----------
1    member-21                   2.2.2.21:43440        udp    S I
2    member-31                   2.2.4.31:43440        static S I
3    member-22                   2.2.2.22:43440        cdp    S I
```

Manually Managing Power

To power on the lab IP phones:

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# energywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.44
Switch(config)# interface gigabitethernet0/3
Switch(config-if)# energywise importance 65
Switch(config-if)# energywise name labphone.5
Switch(config-if)# energywise role role.labphone
Switch(config-if)# end
```

To power off anIP phone connected to a PoE port:

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# energywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.44
Switch(config)# interface gigabitethernet0/2
Switch(config-if)# energywise importance 65
Switch(config-if)# energywise name labphone.5
Switch(config-if)# energywise role role.labphone
Switch(config-if)# energywise level 0
Switch(config-if)# end
```

The switch powers the IP phone regardless of whether or not EnergyWise is enabled.

Automatically Managing Power

The lab IP phones automatically power on at 0800 and power off at 2000.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# energywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.30
Switch(config)# interface gigabitethernet1/0/3
Switch(config-if)# energywise level 10 recurrence importance 90 at 0 8 * * *
Switch(config-if)# energywise level 0 recurrence importance 90 at 0 20 * * *
Switch(config-if)# energywise importance 50
Switch(config-if)# energywise name labInterface.3
Switch(config-if)# energywise role role.labphone
Switch(config-if)# end

Switch# show energywise recurrences
Id     Addr       Class Action Lvl Cron
--     ----       ----- ------ --- ----
1      Gi0/3      QUERY SET    10  minutes: 0 hour: 8 day: * month: * weekday: *
2      Gi0/3      QUERY SET     0  minutes: 0 hour: 20 day: * month: * weekday: *

Switch# show running-config
<output truncated>
interface GigabitEthernet0/3
energywise level 10 recurrence at 0 8 * * *
 energywise level 0 recurrence at 0 20 *
 energywise importance 50
 energywise role role.labphone
 energywise name labInterface.3
end
<output truncated>
```

The PCs on the first floor automatically power on at 0600 and power off at 2000.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# energywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.30
Switch(config)# time-range onfirstfloor
Switch(config-time-range)# absolute start 0:00 1 August 2009
Switch(config-time-range)# periodic weekdays 6:11
Switch(config-time-range)# periodic weekend 9:37
Switch(config)# time-range offfirstfloor
Switch(config-time-range)# absolute start 0:00 1 August 2009
Switch(config-time-range)# periodic weekdays 20:19
Switch(config-time-range)# periodic weekend 18:59
```

```
Switch(config)# interface gigabitethernet0/3
Switch(config-if)# energywise level 10 recurrence importance 70 time-range onfirstfloor
Switch(config-if)# energywise level 0 recurrence importance 70 time offfirstfloor
Switch(config-if)# energywise name floor.1
Switch(config-if)# energywise role pc-mgr
Switch(config-if)# end

Switch# show energywise recurrences
Id     Addr       Class Action Lvl Cron
--     ----       ----- ------ --- ----
1      Gi0/3      QUERY SET    10  onfirstfloor
2      Gi0/3      QUERY SET     0  offfirstfloor

Switch# show running-config
<output truncated>
interface GigabitEthernet0/3
energywise level 10 recurrence importance 70 time-range onfirstfloor
 energywise level 0 recurrence importance 70 time-range offfirstfloor
energywise role pc-mgr
 energywise name floor.1
end
<output truncated>
```

If the time range has end times and days such as

```
Switch(config)# time-range offfirstfloor
Switch(config-time-range)# absolute start 0:00 1 August 2009 23:58 31 December 2011
Switch(config-time-range)# periodic monday 20:01 friday 23:55
Switch(config-time-range)# periodic saturday 18:05 sunday 23:30
```

Note EnergyWise uses only the start time in the time range. EnergyWise ignores any configured end time.

CHAPTER 2

Managing Multiple Entities

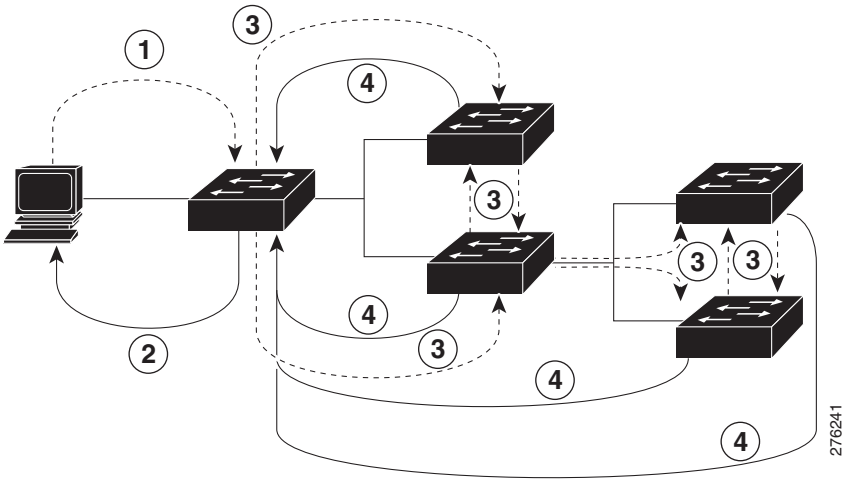
- Running Queries, page 2-1
- Multiple Switches Connected to Multiple End Points, page 2-3
- Using Queries to Manage Power in the Domain, page 2-4
- Examples, page 2-5

Running Queries

The management station sending a query receives all the power-usage responses from the EnergyWise domain. The domain members use neighbor relationships to forward the query.

For secure communication, the domain members use a *shared secret* and send only authenticated queries to the end points.

Figure 2-1 Query Requests and Replies



1	Sends queries and messages to the domain	**3**	Sends queries and messages from domain members and end points
2	Replies to queries and messages from the domain	**4**	Replies to queries and messages from domain members and end points

EnergyWise supports these query types:

- Collect—Receive power-usage information in W from the domain members and end points.
- Save—Save the running configuration of a domain member. Use the **energywise allow query save** global configuration command.
- Set—Change the power level of a domain member or end point in the running configuration.
- Sum—Summarize the information from domain members and end points.

You can filter the results with these attributes:

- Importance—Rate your devices based on the business or deployment context.

  The range is from 1 (least important) to 100 (most important).

  The default is 1.

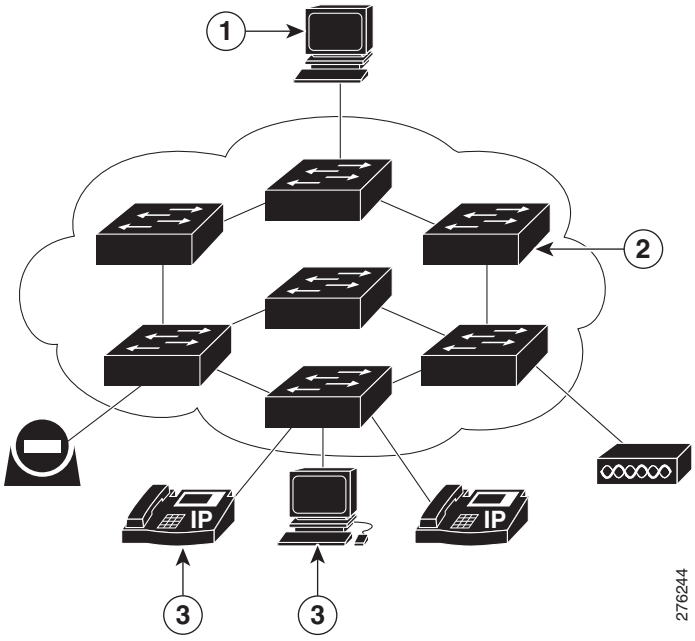
  For example, a desk phone has a lower importance than a business-critical emergency phone.
- Role—Device function based on the business or deployment context.
- Name—Device identity.
- Keywords—Device descriptions (other than the name or role).

The query results show entities with importance values less than or equal to the specified value in a query.

Multiple Switches Connected to Multiple End Points

Three switches send queries and messages to the IP phones, access points, IP cameras, and PCs running the end point SDK.

Figure 2-2 Multiple Switches and End Points Scenario



1	Management station	**3**	End point
2	Domain member		

Using Queries to Manage Power in the Domain

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	**energywise query importance** *importance* {**keywords** *word,word,...* | **name** *name*} **collect** {**delta** | **usage**} [**timeout** *timeout*] or **energywise query importance** *importance* {**keywords** *word,word,...* | **name** *name*} **sum** {**delta** | **usage**} [**timeout** *timeout*]	(Optional) Runs a query to display power information for the domain entities. • **importance** *importance*—Only entities with importance values less than or equal to the specified value respond to the query. The *importance* range is from 1 to 100. • (Optional) **keywords** *word,word*—Filters the results based on one or more keywords. • (Optional) **name** *name*—Filters the results based on the name. For the wildcard, use * or *name** with the asterisk at the end of the name phrase. • **collect** {**delta** | **usage**}—Displays power-usage information in watts (W) from the domain members and end points. – **delta**—Displays the *delta vector* with the *difference* between the actual power usage and the maximum power usage for each power level for what-if calculations. – **usage**—Displays the actual power usage. • **sum** {**delta** | **usage**}—Displays the summary of the power-usage information from domain members and end points. – **delta**—Displays the delta vector. – **usage**—Displays the actual power usage. **Note** In the results with the **sum** keyword, the *Responded* total is not accurate. The *Queried* total is accurate and is the number of entities that respond to the query. • (Optional) **timeout** *timeout*—Sets the time in seconds that the management station waits for query results. The default is 6 seconds. The range is from 1 to 180. Repeat this step to run another query.

	Command	Purpose
Step 2	**energywise query importance** *importance* {**keywords** *word,word,...* | **name** *name*} **set level** *level* [**timeout** *timeout*]	(Optional) Runs a query to power on or off the domain members, PoE ports, or end points. **Caution** Use this query with care. It affects *both* the entity on which you enter the command *and* other domain entities that match the query criteria. • **importance** *importance*—Filters the results based on the importance value. Only entities with values less than or equal to the specified value appear. The *importance* range is from 1 to 100. • (Optional) **keywords** *word,word,...*—Filters the results based on one or more keywords. • (Optional) **name** *name*—Filters the results based on the name. For the wildcard, use * or *name** with the asterisk at the end of the name phrase. • **set level** *level*—Sets the power level of the entities or PoE ports. The range is from 0 to 10. • (Optional) **timeout** *timeout*—Sets the time in seconds that the management station waits for query results. The default is 6 seconds. The range is from 1 to 180. Repeat this step to run another query.

Examples

- Querying with the Name Attribute, page 2-6
- Querying with Keywords, page 2-6
- Querying to Set Power Levels, page 2-6
- Setting the Time-Out Value, page 2-7

In these examples, Switch 1 and Switch 2 are in the same domain. The entity called *shipping.1* is a PoE port on Switch 1, and the entity called *shipping.2* is a PoE port on Switch 2.

Querying with the Name Attribute

To show the power usage of the domain entities with names beginning with *shipping* and with importance values less than or equal to *80*, run this query on Switch 1:

```
Switch# energywise query importance 80 name shipping.* collect usage
EnergyWise query, timeout is 3 seconds:

Host              Name                        Usage       Level   Imp
----              ----                        -----       -----   ---
192.168.20.1      shipping.1                  6.3   (W)   10      1
192.168.20.2      shipping.2                  8.5   (W)   10      1

Queried:  2    Responded:  2      Time:  0.4 seconds
```

The first row (*shipping.1*) is from Switch 1. The second row (*shipping.2*) is from Switch 2, a neighbor of Switch 1.

Querying with Keywords

To show the power usage of IP phones with different names, different roles, and importance values less than or equal to *80*, but all that have the *Admin* keyword, run this query on Switch 1:

```
Switch# energywise query importance 80 keyword Admin collect usage
EnergyWise query, timeout is 3 seconds:

Host              Name                        Usage       Level   Imp
----              ----                        -----       -----   ---
192.168.40.2      shipping.1                   6.3   (W)   10      1
192.168.50.2      orders.1                    10.3   (W)   10      1
192.168.60.3      pc.1                       200.0   (W)    8     75

Queried:  3    Responded:  3      Time:  0.5 seconds
```

Switch 1 reports two phones connected to Switch 2, a neighbor of Switch 1.

Querying to Set Power Levels

Run these queries on Switch 1 to

- Set the power level of the *shipping.2* entity to *0*:

  ```
  Switch# energywise query importance 80 name shipping.2 set level 0
  ```

- Manually set the power level of the *shipping.1* entity and the *shipping.2* entity to *0*:

  ```
  Switch# energywise query importance 90 name shipping.* set level 0
  ```

- Set the power level of devices that have the keyword *Admin* to *10*:

  ```
  Switch# energywise query importance 60 keyword Admin set level 10
  EnergyWise query, timeout is 3 seconds:
  !!!!
  Success rate is (2/2) setting entities

  Queried:  2    Responded:  2      Time:  0.15 seconds
  ```

Verify the power levels:

```
Switch# energywise query importance 85 keyword Admin collect usage
EnergyWise query, timeout is 3 seconds:

Host              Name                          Usage       Level   Imp
----              ----                          -----       -----   ---
192.168.40.2      shipping.1                     6.3   (W)   10      1
192.168.50.2      orders.1                      10.3   (W)   10      1
192.168.60.3      pc.1                         200.0   (W)    8     85

Queried:  3    Responded:  3      Time:  0.9 seconds
```

You can also use the **show energywise usage** privileged EXEC command on Switch 1 and Switch 2 to verify the power levels.

Setting the Time-Out Value

When you use the default timeout value with the **energywise query importance** *importance* {**keywords** *word,word*, ... | **name** *name*} **set level** *level* **timeout** *timeout* command and you wait more than 6 seconds to receive query results, you should increase the timeout value.

For example, if you set a timeout value of 60 seconds and you wait less than 60 seconds to receive query results, the actual query time appears.

```
Switch# energywise query importance 90 name * set level 0
EnergyWise query, timeout is 60 seconds:
!!!
```

CHAPTER 3

EnergyWise CLI Commands

- clear energywise neighbors, page 3-2
- energywise (global configuration), page 3-4
- energywise (interface configuration), page 3-8
- energywise domain, page 3-13
- energywise query, page 3-15
- snmp-server enable traps energywise, page 3-19
- show energywise, page 3-21

Note In the examples, the *interface-id* is in this format: *type slot-or-module-number/port-number*; for example, gigabitethernet 0/5. To specify an interface, see your device software documentation.

clear energywise neighbors

To delete the discovered neighbors and end points running agents or clients from the EnergyWise neighbor table, use the **clear energywise neighbors** command in privileged EXEC mode. The switch immediately rediscovers them.

clear energywise neighbors

Syntax Description

This command does not have arguments or keywords.

Command Default

Default is not defined.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

If the end point is a PC running an agent or client and you enter the **clear energywise neighbors** privileged EXEC command, the PC is removed from the neighbor table.

You can verify that the tables were deleted by entering the **show energywise neighbors** privileged EXEC command.

Examples

This example shows how to delete the neighbor tables:

```
Switch# clear energywise neighbors
Cleared all non static energywise neighbors
```

Related Commands

Command	Description
show energywise neighbors	Displays the EnergyWise neighbor tables.

debug energywise

To enable debugging of EnergyWise end points and managment stations, use the **debug energywise** command in privileged EXEC mode.

debug energywise {**endpoint** | **management**}

Syntax Description

endpoint	Display information about EnergyWise end points running a client or agent.
management	Display information about EnergyWise management stations running power management applications.

Command Default

EnergyWise debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(53)SE1	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(54)SG	This command was introduced on Catalyst 4500 switches.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

The **undebug energywise** command is the same as the **no debug energywise** command.

When you enable debugging on a stacking-capable switch, it is enabled only on the stack master. To enable debugging on a stack member, use the **session** *switch-number* privileged EXEC command to start a session from the stack master. Enter the **debug** command on the stack-member command-line prompt. You can also use the **remote command** *stack-member-number LINE* privileged EXEC command on the stack master to enable debugging on a member switch before you start a session.

Related Commands

Command	Description
show energywise neighbors	Displays the EnergyWise neighbor tables.

energywise (global configuration)

To configure EnergyWise on a domain member or end point, use the **energywise** command in global configuration mode. To disable EnergyWise and to remove the EnergyWise configuration, use the **no** form of this command.

energywise allow query {**save** | **set**}

energywise endpoint security {**none** | **shared-secret** [**0** | **7**] *password*}

energywise {**importance** *importance* | **keywords** *word,word,...* | **level** *level* | **name** *name* | **neighbor** [*hostname*| *ip-address*] *udp-port-number* | **role** *role*}

energywise management security shared-secret [**0** | **7**] *mgmt-password* [**port** *tcp-port-number*]

no energywise {**allow query** {**save** | **set**} | **endpoint** | **importance** | **keywords** [*word,word*] | **management** | **name** | **neighbor** [*hostname*| *ip-address*] *udp-port-number* | **role**}

Syntax Description

allow query {**save** | **set**}	If the switch receives a query from the management station or another domain member, configures the switch to • **save**—Responds to a query to save the running configuration. • **set**—Responds to a query to change the power level or the EnergyWise attributes.
endpoint security {**none** | **shared-secret** [**0** | **7**] *password*}	Sets the security mode for an endpoint. • **none**—Disables security. • **shared-secret**—Uses a password for secure communication with the connected domain member. • (Optional) **0**—Uses an unencrypted password. • (Optional) **7**—Uses a hidden password. If you do not enter **0** or **7**, the default is 0. • For the *password* – You can enter alphanumeric characters and symbols such as #, (, $, !, and &. – Do not enter an asterisk (*) or a blank space between the characters or symbols.
importance *importance*	Sets the importance. The range is from 1 to 100.
keywords *word,word,...*	Assigns at least one keyword. When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.

level *level*	Sets the power level. The range is from 0 to 10.
name *name*	Specifies the EnergyWise-specific entity name. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
neighbor [*hostname*| *ip-address*] *udp-port-number*	Assigns a static neighbor: • (Optional) DNS (Domain Name System) hostname (*hostname*) or IP address (*ip-address*). • UDP port (*udp-port-number*) that sends and receives queries. The range is from 1 to 65000.
role *role*	Specifies the role of the entity in the EnergyWise domain. For example, *lobby.b20*. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
management security shared-secret [**0** | **7**] *mgmt-password* **[port** *tcp-port-number*]	Sets the management password for the management station communicating with the domain. • (Optional) **0**—Uses an unencrypted password. • (Optional) **7**—Uses a hidden password. If you do not enter **0** or **7**, the default is 0. • For the *mgmt-password* – You can enter alphanumeric characters and symbols such as #, (, $, !, and &. – Do not enter an asterisk (*) or a blank space between the characters or symbols. • (Optional) **port** *tcp-port-number*—Specifies the TCP port for management access. The port number range is from 1025 to 65535.

Command Default

EnergyWise is disabled.

The switch interfaces do not respond to **save** queries.

The interfaces respond to **set** queries.

The end-point and management passwords are not set.

The importance is 1.

Keywords are not defined.

The power level is 10.

The *tcp-port-number* is 43440.

The name is the hostname.

Neighbors are not assigned.

The role is the model number.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SE	On the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches • The **management** *udp-port-number* keywords were replaced with the **management security shared-secret** [**0** | **7**] *shared-secret* **port** *tcp-port-number* keywords. • The **allow query** {**save** | **set**} keywords were added.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(54)SG	On Catalyst 4500 switches • The **management** *udp-port-number* keywords were replaced with the **management security shared-secret** [**0** | **7**] *shared-secret* **port** *tcp-port-number* keywords. • The **allow query** {**save** | **set**} keywords were added.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

When you add a switch to a domain, EnergyWise is enabled on the switch and its PoE ports.

When setting a hidden (encrypted) password, enter the **service password-encryption** global configuration command before entering the **energywise management security shared-secret 7** *mgmt-password* [**port** *tcp-port-number*] global configuration command.

If you enter the **no energywise level** command, the switch does not immediately change the power level to the default. The power level changes when the switch restarts or when you enter the **energywise level** *level* command.

Examples

This example shows how to enable EnergyWise, assign an IP phone to a domain, and set the domain and management passwords.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# eenergywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.30
Switch(config)# energywise importance 50
Switch(config)# energywise keywords lab1,devlab
Switch(config)# service password-encryption
Switch(config)# energywise management security shared-secret 7 cisco port 60500
Switch(config)# energywise name Entity01
Switch(config)# energywise neighbor member-21 43440
Switch(config)# energywise role role.labaccess
Switch(config)# energywise allow query save
Switch(config)# end
```

Related Commands

Command	Description
show energywise	Displays the EnergyWise settings and status.
show energywise domain	Displays the domain to which the entity belongs.
show energywise recurrences	Displays the recurring-event settings and status.

energywise (interface configuration)

To configure EnergyWise on the switch port, use the **energywise** command in interface configuration mode. To disable EnergyWise and to remove the EnergyWise configuration, use the **no** form of this command.

energywise [**activitycheck** | **allow query set** | **importance** *importance* | **keywords** *word,word,...* | **level** *level* [**recurrence importance** *importance* {**at** *minute hour day_of_month month day_of_week* | **time-range** *time-range-name*} | **name** *name* | **role** *role*]

energywise domain *domain-name* **security** {**ntp-shared-secret** | **shared-secret**} [**0** | **7**] *shared-secret* [**protocol udp port** *udp-port-number* [**interface** *interface-id* | **ip** *ip-address*]]

no energywise [**activitycheck** | **allow query set** | **importance** | **keywords** [*word,word,...*] | **level** [*level* **recurrence importance** *importance* {**at** *minute hour day_of_month month day_of_week* | **time-range** *time-range-name*}] | **name** [*name*] | **role** [*role*]]

no energywise domain

Note In the examples, the *interface-id* is in this format: *type slot-or-module-number/port-number*; for example, gigabitethernet 0/5. To specify an interface, see your device software documentation.

Syntax Description

activitycheck	(Optional) Configures the switch to wait until a Cisco IP phone connected to a PoE port is not sending or receiving traffic before the switch powers off the port. **Note** The switch cannot determine if the IP phone is in the hold state. The command is supported on • Catalyst 6500 switches (see the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.) • Catalyst 4500 switches • Catalyst 3750-X, 3750-E, 3750, 3560-X, 3650-E, 3560, and 2960 switches • Cisco EtherSwitch service modules (NME-16ES-1G, NME-16ES-1G-P, NME-X-23ES-1G, NME-X-23ES-1G-P, NME-XD-24ES-1S-P, NME-XD-48ES-2S-P) • Cisco enhanced EtherSwitch service modules (SM-D-ES2-48, SM-D-ES3-48-P, SM-D-ES3G-48-P, SM-ES2-16-P, SM-ES2-24, SM-ES2-24-P, SM-ES3-16-P, SM-ES3-24-P, SM-ES3G-16-P, SM-ES3G-24-P)
allow query set	(Optional) If the interface receives a query from the management station or another domain member, configures the interface to respond to a query changing the power level and the EnergyWise attributes.
importance *importance*	(Optional) Sets the importance of the port. The range is from 1 to 100.

keywords *word,word*	(Optional) Assigns at least one keyword for the port. When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
level *level*	(Optional) Sets the power level of the port. The range is from 0 and 10. • To power off the end point, enter **0**. • To power on the end point – If it is a PoE end point, enter **10**. – If it is not, enter a power level from 1 to 10. The end point determines the appropriate action.
recurrence importance *importance* {**at** *minute hour day_of_month month day_of_week* | **time-range** *time-range-name*}	(Optional) Schedules the power-on or power-off event. • **importance** *importance*—The event occurs if the importance value of the end point is less than or equal to the specified importance value. The range is from 1 to 100. • **at** *minute hour day_of_month month day_of_week*—Specifies the time (24-hour format) in cron format for the recurring event. – *minute*—The range is from 0 to 59. Use * for the wildcard. – *hour*—The range is from 0 to 23. Use * for the wildcard. – *day_of_month*—The range is from 1 to 31. Use * for the wildcard. – *month*—The range is from 1 (January) to 12 (December). Use * for the wildcard. – *day_of_week*—The range is from 0 (Sunday) to 7 (Sunday). Use * for the wildcard. • **time-range** *time-range-name*—Specifies the time range name for the recurring event. The event uses the switch time.
name *name*	(Optional) Specifies the EnergyWise-specific port name. • You can enter alphanumeric characters and symbols such as #, (, %, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.

role *role*	(Optional) Specifies the role of the port in the domain. For example, lobbyport. • You can enter alphanumeric characters and symbols such as #, (, %, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
domain *domain-name* **security** {**ntp-shared-secret** | **shared-secret**} [**0** | **7**] *shared-secret* [**protocol udp port** *udp-port-number* [**interface** *interface-id* | **ip** *ip-address*]]	Configures the EnergyWise domain. See the **energywise domain** interface configuration command.

Command Default

EnergyWise is disabled.

The switch to waits until a Cisco IP phone connected to a PoE port is not sending or receiving traffic before powering off the port.

The switch responds to a query to change the power level and the EnergyWise attributes.

The importance is 1.

Keywords are not defined.

The power level is 10.

The recurring event is not configured.

The name is the short version of the port name; for example, Gi1.0.2 for Gigabit Ethernet 1/0/2.

The role is the model number.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SE	The **activitycheck**, **allow query** {**save** | **set**}, and **recurrence time-range** *time-range-name* keywords were added on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(54)SG	The **activitycheck**, **allow query** {**save** | **set**}, and **recurrence time-range** *time-range-name* keywords were added on Catalyst 4500 switches.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

Before using the **energywise activitycheck** command, see the "Using the Call In-Progress Feature" section in the "Managing Single Entities" chapter.

If you enter the **no energywise level** command, the switch does not immediately change the power level to the default. The power level changes when the switch restarts or when you enter the **energywise level** *level* command.

For a recurring event, to configure multiple dates and times using the cron format (*minute hour day_of_month month day_of_week*)

- Use a comma (,) to specify a list of values without spaces between the values, for example, **1,3,4,7,8**.
- Use a dash (-) to specify a range of values, for example, **1-6** (same as **1,2,3,4,5,6**).
- Use an asterisk (*) for a wildcard.
- Use a slash (/) to skip a specific number of values. For example
  - Enter ***/15 * * * *** for the event occurs every 15 minutes.
  - Enter **0-59/3 * * * *** or **0,20,40** for the event to occur every 20 minutes.
  - Enter ***/61 * * * *** for the event to occur every hour.
  - Enter *** */3 * * *** or **0,3,6,9,12,15,18,21** for the event to occur every three hours.

For information about specifying the *day_of_month* and the *day_of_week* in the **energywise level** *level* **recurrence importance** *importance* **at** *minute hour day_of_month month day_of_week* command, see the "Configuration Guidelines" section in the "Managing Single Entities" chapter.

Examples

This example shows how to enable and configure EnergyWise on a port and how to configure a recurring event.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# service password-encryption
Switch(config)# energywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.30
Switch(config)# time-range onfirstfloor
Switch(config-time-range)# absolute start 0:00 1 August 2009
Switch(config-time-range)# periodic weekdays 6:00
Switch(config-time-range)# periodic weekend 9:00
Switch(config)# time-range offfirstfloor
Switch(config-time-range)# absolute start 0:00 1 August 2009
Switch(config-time-range)# periodic weekdays 20:00
Switch(config-time-range)# periodic weekend 18:00
Switch(config)# interface gigabitethernet0/3
Switch(config-if)# energywise level 10 recurrence importance 70 time-range onfirstfloor
Switch(config-if)# energywise level 0 recurrence importance 70 time offfirstfloor
Switch(config-if)# energywise name floor.1
Switch(config-if)# energywise role pc-mgr
Switch(config-if)# end
```

Related Commands

Command	Description
absolute	Sets a specific time and day for a recurring event.
show energywise	Displays the EnergyWise settings and status.
show energywise domain	Displays the domain to which the entity belongs.
show energywise recurrences	Displays the recurring-event settings and status.

Command	Description
periodic	Sets a weekly time and day for a recurring event.
time-range	Assigns a name to the time range for a recurring event.

energywise domain

To enable EnergyWise on an entity, assign the entity to a domain, set the domain security mode, and set the domain password, use the **energywise domain** command in global configuration mode . To disable EnergyWise and to remove the EnergyWise configuration, use the **no** form of this command.

energywise domain *domain-name* **security** {**ntp-shared-secret** | **shared-secret**} [**0** | *7*] *shared-secret* [**protocol udp port** *udp-port-number* [**interface** *interface-id* | **ip** *ip-address*]]

no energywise domain

Syntax Description

domain *domain-name*	Assign the entity to a domain with the specified *domain-name*. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
security {**ntp-shared-secret** | **shared-secret**} [**0** | *7*] *domain-password*	Sets the domain security mode and the domain password to authenticate all communication in the domain. • **ntp-shared-secret**—Uses a strong password with Network Time Protocol (NTP). If the time between members varies ±30 seconds, the entity drops events. • **shared-secret**—Sets a strong password without NTP. • (Optional) **0**—Uses an unencrypted password. • (Optional) **7**—Uses a hidden password. If you do not enter **0** or **7**, the default is 0. • For the *domain-password* – You can enter alphanumeric characters and symbols such as #, (, $, !, and &. – Do not enter an asterisk (*) or a blank space between the characters or symbols.
protocol udp port *udp-port-number*	(Optional) Specifies UDP as the communication protocol, and specifies the UDP port that communicates with the domain. The range is from 1 to 65000.
interface *interface-id*	(Optional) Specifies the port that communicates with the domain if the IP address is dynamically assigned.We recommend that you specify the *interface-id*. You should use this in a bridged network.
ip *ip-address*	(Optional) Specifies the IP address that communicates with the domain if the interface is a switched virtual interface (SVI) and VLAN trunking protocol (VTP) pruning is enabled. You should use this in a routed network.

Command Default

EnergyWise is disabled, and the entity is not assigned to a domain.

The domain password is not set.

The *udp-port-number* is 43440.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SE	The **secret** [**0** | **7**] *password* keywords were replaced with the **security** {**ntp-shared-secret** | **shared-secret**} [**0** | ***7***] *domain-password* keywords on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(54)SG	The **secret** [**0** | **7**] *password* keywords were replaced with the **security** {**ntp-shared-secret** | **shared-secret**} [**0** | ***7***] *domain-password* keywords on Catalyst 4500 switches.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

If you enter the **energywise domain** *domain-name* **security** {**ntp-shared-secret** | **shared-secret**} [**0** | **7**] *domain-password* command, the switch selects the first available port for communicating with the management station.

When setting a hidden (encrypted) password, enter the **service password-encryption** global configuration command before entering the **energywise management security shared-secret 7** *mgmt-password* [**port** *tcp-port-number*] global configuration command.

Examples

This example shows how to enable EnergyWise, set the *domain-name* and *domain-password*, and specify the IP address:

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# service password-encryption
Switch(config)# energywise domain cisco security shared-secret cisco protocol udp port
43440 ip 2.2.4.30
```

Related Commands

Command	Description
show energywise	Displays the EnergyWise settings and status.
show energywise domain	Displays the domain to which the entity belongs.

energywise query

To display power information and to set the power level of domain members, use the **energywise query** command in privileged EXEC mode.

energywise query importance *importance* {**keywords** *word,word,...* | **name** *name*} **collect** {**delta** | **usage**} [**timeout** *timeout*]

energywise query importance *importance* {**keywords** *word,word,...* | **name** *name*} **set level** *level* [**timeout** *timeout*]

energywise query importance *importance* {**keywords** *word,word,...* | **name** *name*} **sum** {**delta** | **usage**} [**timeout** *timeout*]

Syntax Description

importance *importance*	Only entities with importance values less than or equal to the specified value respond to the query. The *importance* range is from 1 to 100.
keywords *word,word,...*	Filters the results based on one or more keywords. When specifying multiple keywords, separate the keywords with commas, and do not use spaces between keywords. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
name *name*	Filters the results based on the name. For the wildcard, use * or *name** with the asterisk at the end of the name phrase. • You can enter alphanumeric characters and symbols such as #, (, $, !, and &. • Do not enter an asterisk (*) or a blank space between the characters or symbols.
collect {**delta** | **usage**}	Displays power-usage information in watts (W) from the domain members and end points. • **delta**—Display the *delta vector* with the *difference* between the actual power usage and the maximum power usage for each power level for what-if calculations. • **usage**—Display the actual power usage.
timeout *timeout*	(Optional) Sets the time in seconds that the management station waits for query results. The range is from 1 to 180.

set level *level*	Sets the power level of the domain entities, including the PoE ports. The range is from 0 to 10.
sum {**delta** | **usage**}	Displays the summary of the power-usage information from domain members and end points. • **delta**—Display the delta vector. • **usage**—Display the actual power usage.

Command Default

The *timeout* value is 6 seconds.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SE	The **timeout** *timeout* keywords were added on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(54)SG	The **timeout** *timeout* keywords were added on Catalyst 4500 switches.
12.2(55)SE	The default timeout value was changed from 3 seconds to 6 seconds.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

In the results from the **sum** keyword, the *Responded* total is not accurate. The *Queried* total is accurate and is the number of entities that respond to the query.

Caution Use this query with care. It affects the entity on which you enter the command *and* other domain devices that match the query criteria.

Examples

These examples show how to filter with the entity name.

```
Switch# energywise query importance 50 name phone* collect usage
EnergyWise query, timeout is 3 seconds:

Host             Name                          Usage       Level   Imp
----             ----                          -----       -----   ---
2.2.2.21         phone                           0.0 (W)   10      1
2.2.2.21         phone                          15.4 (W)   10      1
2.2.2.21         phoneA                          0.0 (W)   10      1
2.2.2.22         phone                           0.0 (W)   10      1
2.2.2.21         phoneB                          0.0 (W)   10      1
2.2.2.22         phoneC                         15.4 (W)   10      1
```

```
2.2.2.21          phone                          0.0 (W)   10      1
2.2.2.23          phoneD                        15.4 (W)   10      1
2.2.2.21          phone                          0.0 (W)   10      1
Queried:  9    Responded:  9      Time:  0.26 seconds

Switch# energywise query importance 80 name * sum usage
EnergyWise query, timeout is 3 seconds:

Total Usage
-----------
346.3 (W)

Queried:  147    Responded:  147      Time:  0.121 seconds

Switch# energywise query importance 90 name lobby* collect usage

EnergyWise query, timeout is 3 seconds:

Host              Name                          Usage       Level   Imp
----              ----                          -----       -----   ---
2.2.4.30          lobbyInterface.17              10.0 (W)   10      1
2.2.6.20          lobbypc.17                    200.0 (W)    8     90

Queried:  2    Responded:  2      Time:  0.7 seconds

Switch# energywise query importance 900 name Fa1.0.4* sum usage

EnergyWise query, timeout is 3 seconds:

Total Usage
-----------
129.0 (W)

Queried:  10    Responded:  10      Time:  0.6 seconds
```

This example shows the summary of the delta values and the potential power change in the domain.

```
Switch# energywise query importance 90 name * collect delta
EnergyWise query, timeout is 3 seconds:

Level   Label       Delta Power (W)
-----   -----       -----------
0       Shut        -12.9
1       Hibernate   +723.8
2       Sleep       +723.8
3       Standby     +723.8
4       Ready       +723.8
5       Low         +723.8
6       Frugal      +723.8
7       Medium      +723.8
8       Reduced     +723.8
9       High        +723.8
10      Full        +723.8

Queried:  48    Responded:  48      Time:  0.15 seconds
```

These examples show how to change the power level of all the domain members and end points.

```
Switch# energywise query importance 90 name * set level 0
EnergyWise query, timeout is 3 seconds:
!!!
```

snmp-server enable traps energywise

To enable the switch to send Simple Network Management Protocol (SNMP) notifications for EnergyWise traps or inform requests to the network management system (NMS), use the **snmp-server enable traps energywise** command in global configuration mode. To return to the default setting, use the **no** form of this command.

snmp-server enable traps energywise [**event-occured**] [**level-change**] [**neighbor-added**] [**neighbor-deleted**]

no snmp-server enable traps energywise

Syntax Description

event-occured	(Optional) Enable EnergyWise event traps.
level-change	(Optional) Enable EnergyWise entity power-level change traps.
neighbor-added	(Optional) Enable EnergyWise entity traps when neighbors are added.
neighbor-deleted	(Optional) Enable EnergyWise entity traps when neighbors are removed.

Command Default

The sending of EnergyWise traps is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

Use the **snmp-server host** global configuration command to specify the host (network management system [NMS]) that receives the traps.

If you do not specify any keywords, all of the EnergyWise traps are enabled.

You can verify your setting by entering the **show energywise** or the **show running-config** privileged EXEC command.

Examples

To send EnergyWise traps to the NMS:

```
Switch(config)# snmp-server enable traps energywise
```

To send only EnergyWise event traps to the NMS:

```
Switch(config)# snmp-server enable traps energywise event-occured
```

Related Commands

Command	Description
show energywise	Displays the EnergyWise settings and status.
show running-config	Displays the operating configuration.

show energywise

To display the EnergyWise settings, the status of the domain member, and the status of the switch port with a connected end point, use the **show energywise** privileged EXEC command.

show energywise neighbors [**categories** | **children** [**provisioned**] | **domain** | **events** | **level** [**children** | **current** [**children**] | **delta** [**children**]] | **neighbors** | **recurrences** | **statistics** | **usage** [**children**] | **version**] [| {**begin** | **exclude** | **include**} *expression*]

Note In the examples, the *interface-id* is in this format: *type slot-or-module-number/port-number*; for example, gigabitethernet 0/5. To specify an interface, see your device software documentation.

Syntax Description

categories	(Optional) Displays the power levels.
children [**provisioned**]	(Optional) Displays the status of the connected end point. • **provisioned**—Displays a summary of the EnergyWise information for the switch and the connected end points.
domain	(Optional) Displays the entity name, domain name, protocol, IP address, and UDP port for the domain.
events	(Optional) Displays the last ten events (messages) sent to other members in the domain.
level [**children** | **current** [**children**] | **delta** [**children**]	(Optional) Displays the actual power levels. • **children**—Actual power levels for the domain member and connected end points. • **current**—Actual power levels for the domain member. (Optional) **children**—Actual power levels for the domain member and connected end points. • **delta**—Delta vector for the domain member. (Optional) **children**—Delta vector for the domain member and connected end points.
neighbors	(Optional) Displays the neighbor table for the switch.
recurrences	(Optional) Displays the EnergyWise settings and status for the recurring event.
statistics	(Optional) Displays the counters for events and errors.
usage [**children**]	(Optional) Displays the actual power for the domain member. • **children—**Displays the actual power for the domain member and connected end points.
version	(Optional) Displays the EnergyWise version.
| **begin**	(Optional) Displays begins with the line that matches the *expression*.
| **exclude**	(Optional) Displays excludes lines that match the *expression*.
| **include**	(Optional) Displays includes lines that match the specified *expression*.
expression	Expression in the output to use as a reference point.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(50)SE	This command was introduced on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SE	The **children provisioned** keywords were added on the Catalyst 3750-E, 3750, 3560-E, 3560, and 2960 switches.
12.2(52)SG	This command was introduced on Catalyst 4500 switches.
12.2(54)SG	The **children provisioned** keywords were added on Catalyst 4500 switches.
12.2(33)SXI4	This command was introduced on the Catalyst 6500 switches. See the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices.
15.0(1)M2	This command was introduced on Cisco Integrated Service Routers Generation 2 (ISR G2), including Cisco 3900, 2900, and 1900 ISRs.

Usage Guidelines

Expressions are case sensitive. For example, if you enter **| exclude output**, the lines that contain *output* do not appear, but the lines that contain *Output* appear.

Examples

```
Switch# show energywise
Module/
Interface   Role              Name                 Usage      Lvl   Imp  Type
---------   ----              ----                 -----      ---   ---  ----
            Manager           NRGYZ-TB-09          130.0 (W)  10    1    parent

Switch# show energywise children
Module/
Interface   Role              Name                 Usage      Lvl   Imp  Type
---------   ----              ----                 -----      ---   ---  ----
Manager                       NRGYZ-TB-09          130.0 (W)  10    1    parent
Gi0/3       AIR-LAP521G-A-K9  LWAPP-AP-1           9.91  (W)  10    1    PoE

Switch# show energywise children provisioned
Module/
Interface   Role              Name                 Usage      Lvl   Imp  Type
---------   ----              ----                 -----      ---   ---  ----
Manager                       NRGYZ-TB-09          130.0 (W)  10    1    parent
Gi0/1       interface         Gi0.1                0.0   (W)  10    1    PoE
G0/2        interface         Gi0.2                0.0   (W)  10    1    PoE
Gi0/3       AIR-LAP521G-A-K9  LWAPP-AP-1           9.91  (W)  10    1    PoE
Gi0/4       interface         Gi0.4                0.0   (W)  10    1    PoE
Gi0/5       interface         Gi0.5                0.0   (W)  10    1    PoE
Gi0/6       interface         Gi0.6                0.0   (W)  10    1    PoE
Gi0/7       interface         Gi0.7                0.0   (W)  10    1    PoE
<output truncated>

Total Displayed: 49     Usage: 139.9
```

```
Switch# show energywise domain
Name      : Manager-1
Domain    : cisco
Protocol  : udp
IP        : 2.2.2.21
Port      : 43440

Switch# show energywise events
------------------------------------------
Sequence:  565316   Priority:  100   References:  0:1   Errors:
Class:     PN_CLASS_DISCOVERY
Action:    PN_ACTION_CPQR_POWERNET_DISCOVERY_DISCOVERY_UPDATE
Reply To:  2.2.2.24:43440
------------------------------------------
Sequence:  566349   Priority:  100   References:  0:1   Errors:
Class:     PN_CLASS_DISCOVERY
Action:    PN_ACTION_CPQR_POWERNET_DISCOVERY_DELETE
Reply To:  2.2.2.24:43440
------------------------------------------
Sequence:  799789   Priority:  100   References:  0:1   Errors:
Class:     PN_CLASS_DISCOVERY
Action:    PN_ACTION_CPQR_POWERNET_DISCOVERY_DELETE
Reply To:  2.2.2.23:43440
------------------------------------------
<output truncated>
```

```
Switch# show energywise level

                                                  Levels (Watts)
Interface   Name              0     1     2     3     4     5     6     7     8     9     10
---------   ----              ------------------------------------------------------------
            lobby.1           0.0   130.0 130.0 130.0 130.0 130.0 130.0 130.0 130.0 130.0 130.0
```

```
Switch# show energywise level children
Levels (Watts)
Interface   Name            0     1     2     3     4     5     6     7     8     9     10
---------   ----            ------------------------------------------------------------
            lobby.1         0.0   130.0 130.0 130.0 130.0 130.0 130.0 130.0 130.0 130.0 130.0
Gi0/1       Gi1.0.1         0.0   15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4
Gi0/2       LWAPP-AP-1      0.0   9.91  9.91  9.91  9.91  9.91  9.91  9.91  9.91  9.91  9.91
Gi0/3       Gi1.0.3         0.0   15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4
Gi0/4       Gi1.0.4         0.0   15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4
Gi0/5       Gi1.0.5         0.0   15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4  15.4
<output truncated>
```

```
Switch# show energywise level current
Interface   Name                    Level  Value
---------   ----                    -----  -----
            lobby.1                 10     130.0 (W)

Switch# show energywise level current children
Interface   Name                    Level  Value
---------   ----                    -----  -----
            lobby.1                 10     558.0 (W)
Gi0/1       Gi1.0.1                 1      15.4  (W)
Gi0/2       LWAPP-AP-1              10     9.91  (W)
Gi0/3       LWAPP-AP-2              10     9.91  (W
Gi0/4       Gi0.4                   1      15.4  (W)
Gi0/5       Gi0.5                   1      15.4  (W)
Gi0/6       Gi0.6                   1      15.4  (W)
<output truncated>
```

```
Switch# show energywise level delta
                                                        Levels (Watts)
Interface   Name                    0      1      2      3      4      5      6      7      8      9      10
---------   ----                    ------------------------------------------------------------------------
            lobby.1                -130.0 0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

Switch# show energywise level delta child
                                                          Levels (Watts)
Interface   Name                    0      1      2      3      4      5      6      7      8      9      10
---------   ----                    ------------------------------------------------------------------------
            lobby.1                -558.0  0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
Gi0/1       Gi0.1                   0.0    15.4   15.4   15.4   15.4   15.4   15.4   15.4   15.4   15.4   15.4
Gi0/2       LWAPP-AP-1             -9.91   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
Gi0/3       Gi0.3                   0.0    15.4   15.4   15.4   15.4   15.4   15.4   15.4   15.4   15.4   15.4
<output truncated>
```

```
Switch# show energywise neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone, U - Unknown
Id   Neighbor Name                Ip:Port                Prot   Capability
--   -------------                -------                ----   ----------
1    Router A                     10.0.0.11:43440        udp    R
2    Switch A                     10.0.0.12:43440        cdp    S I
3    Router B                     10.0.0.36:43440        cdp    U
4    IP_phone A                   10.0.0.14:43440        udp    U
5    Switch B                     10.0.0.4:43440         udp    R
6    Switch C                     10.0.0.5:43440         udp    R
7    Router C                     10.0.0.7:43440         udp    R
```

When you use the **energywise level** *level* **recurrence importance** *importance* {**at** *minute hour day_of_month month day_of_week* global configuration command

```
Switch# show energywise recurrences
Id     Addr       Class Action Lvl Cron//Time-range
--     ----       ----- ------ --- ---------------
2      Gi0/17     QUERY SET     3  minutes: 0 hour: 8 day: * month: * weekday: *
3      Gi0/18     QUERY SET     3  minutes: 0 hour: 8 day: * month: * weekday: *
4      Gi0/19     QUERY SET     3  minutes: 0 hour: 8 day: * month: * weekday: *
```

When you use the **energywise level** *level* **recurrence importance** *importance* **time-range** *time-range-name* global configuration command

```
Switch# show energywise recurrences
Id     Addr       Class Action Lvl Cron/Time-range
--     ----       ----- ------ --- ---------------
1      Gi0/1      QUERY SET    10  tt-range

Switch# show energywise statistics
Children:  48  Errors:  0  Drops:  31  Events:  643

Switch# show energywise usage
Interface   Name                    Usage      Caliber
---------   ----                    _____      _______
            lobby.1                 130.0 (W)  max
```

```
Switch# show energywise usage child
Interface   Name                      Usage      Caliber
---------   ----                      _____      _______
            NRGYZ-TB-09               130.0 (W)  max
Gi0/1       Gi0.1                     0.0  (W)   presumed
Gi0/2       LWAPP-AP-1                9.91 (W)   trusted
Gi0/3       Gi0.3                     0.0  (W)   presumed
Gi0/4       Gi0.4                     0.0  (W)   presumed
Gi0/5       Gi0.5                     0.0  (W)   presumed
<output truncated>
Total Displayed: 49     Usage: 139.9

Switch# show energywise version
EnergyWise is Enabled
IOS Version:  12.2(52)SE
EnergyWise Specification: 0.6.33
```

Related Commands

Command	Description
energywise (global configuration)	Enables and configures EnergyWise on the entity.
energywise (interface configuration)	Configures EnergyWise on the PoE port.

CHAPTER 4

Troubleshooting EnergyWise

- Using CLI Commands, page 4-1
- Verifying the Power Usage, page 4-2

Using CLI Commands

Table 4-1 show Privileged EXEC Commands

Command	Purpose
show energywise	Displays the settings and status for the entity.
show energywise children	Displays the status of the connected end points.
show energywise children provisioned	Displays a summary of the EnergyWise information for the switch and the connected end points.
show energywise domain	Displays the domain to which the entity belongs.
show energywise events	Display the last ten events (messages) sent to other entities in the domain.
show energywise neighbors	Displays the neighbor tables for the switch.
show energywise recurrences	Displays the EnergyWise settings and status for recurrence.
show energywise statistics	Displays the counters for events and errors.
show energywise usage	Displays the actual power usage on the entity.
show energywise version	Displays the EnergyWise version.
show version	Displays the software version.
show power inline	Displays the PoE status.
show cdp neighbors	Displays the neighbors discovered by CDP.

For more information about the commands, see Chapter 3, “EnergyWise CLI Commands,” and the platform-specific command references on Cisco.com.

Verifying the Power Usage

This example shows that the Cisco 7960 IP Phone uses 6.3 W and that the Cisco 7970G IP Phone uses 10.3 W.

```
Switch# show energywise usage children
Interface   Name            Usage      Caliber
---------   ----            -----      -------
            Switch          144.0 (W)  max
Gi0/1       Gi0.1           6.3 (W)    trusted
Gi0/2       Gi0.2           10.3 (W)   trusted
```

APPENDIX A

Cisco EnergyWise and Catalyst 4500 Switches

For Catalyst 4500 switches running EnergyWise Phase 2 and later:

- For high availability
  - To perform an ISSU downgrade from a Cisco IOS release supporting EnergyWise Phase 2 to an earlier software release that does not support EnergyWise, disable EnergyWise on the switch first.
  - To perform an ISSU downgrade from a software release supporting EnergyWise Phase 2 to a release supporting EnergyWise Phase 1, disable EnergyWise on the switch first because of CLI compatibility issues between EnergyWise Phase 1 and EnergyWise Phase 2.
  - To perform an ISSU downgrade from a Cisco IOS release supporting EnergyWise Phase 2 to an earlier release that does not support EnergyWise, you must remove the **snmp-server enable traps energywise** global configuration command from the switch configuration.
  - During an ISSU upgrade from a software release supporting EnergyWise Phase 1 to a release supporting EnergyWise Phase 2, the EnergyWise settings in the running configuration are updated. The switch sets the management password to the same domain password as in the **energywise domain** command. You must enter the **copy running-config startup-config** privileged EXEC command to save the EnergyWise settings in the configuration file.
- For stateful switchover (SSO) mode
  - On a redundant chassis operating in SSO mode, the **energywise neighbor** *hostname udp-port-number* global configuration command does not work. Use the **energywise neighbor** *ip-address udp-port-number* global configuration command to specify the IP address of the host.

Note If your switch is running EnergyWise Phase 2, enter the **no energywise domain** global configuration command to disable EnergyWise before downgrading your software to a release supporting EnergyWise Phase 1.

For more information, see the “CLI Compatibility Issues” section in the “Managing Single Entities” chapter.

APPENDIX B

Cisco EnergyWise and Catalyst 6500 Switches

For Catalyst 6500 switches running EnergyWise Phase 2 and later:

- For high availability
  - To perform an ISSU downgrade from a Cisco IOS release supporting EnergyWise Phase 2 to an earlier software release that does not support EnergyWise, disable EnergyWise on the switch first.
  - To perform an ISSU downgrade from a Cisco IOS release supporting EnergyWise Phase 2 to an earlier release that does not support EnergyWise, remove the **snmp-server enable traps energywise** global configuration command from the switch configuration.
- For stateful switchover (SSO) mode
  - On a redundant chassis operating in SSO mode, the **energywise neighbor** *hostname udp-port-number* global configuration command does not work. Use the **energywise neighbor** *ip-address udp-port-number* global configuration command to specify the IP address of the host.

For more information, see the “CLI Compatibility Issues” section in the “Managing Single Entities” chapter.

APPENDIX C

Important Notice

- Disclaimer, page C-1
- Statement 361—VoIP and Emergency Calling Services do not Function if Power Fails, page C-1
- Statement 1071—Warning Definition, page C-3

Disclaimer

Cisco EnergyWise enables you to reduce energy consumption in your network by turning off the power to devices when they are not in use. If IP phones are part of your network, they can also be turned off through EnergyWise, in which case calls cannot be made or received, and the phones cannot be turned on except by the network administrator or according to rules established in EnergyWise by the network administrator. Laws in the location of your network might require phones to remain available for emergencies. It is your responsibility to identify the laws which apply and to comply with them. Even in the absence of a law, we strongly recommend that you designate certain phones which will always be on and available to make and receive emergency calls. These phones should be clearly identified, and all employees or others who might require emergency access to make or receive calls should be informed of the availability of these phones.

Statement 361—VoIP and Emergency Calling Services do not Function if Power Fails

Warning **Voice over IP (VoIP) service and the emergency calling service do not function if power fails or is disrupted. After power is restored, you might have to reset or reconfigure equipment to regain access to VoIP and the emergency calling service. In the USA, this emergency number is 911. You need to be aware of the emergency number in your country.**

Waarschuwing **Voice over IP (VoIP)-service en de service voor noodoproepen werken niet indien er een stroomstoring is. Nadat de stroomtoevoer is hersteld, dient u wellicht de configuratie van uw apparatuur opnieuw in te stellen om opnieuw toegang te krijgen tot VoIP en de noodoproepen. In de VS is het nummer voor noodoproepen 911. U dient u zelf op de hoogte te stellen van het nummer voor noodoproepen in uw land.**

Varoitus **Voice over IP (VoIP) -palvelu ja hätäpuhelupalvelu eivät toimi, jos virta katkeaa tai sen syötössä esiintyy häiriöitä. Kun virransyöttö on taas normaali, sinun täytyy mahdollisesti asettaa tai määrittää laitteisto uudelleen, jotta voisit jälleen käyttää VoIP-palvelua ja hätäpuhelupalvelua. Yhdysvalloissa hätänumero on 911. Selvitä, mikä on omassa kotimaassasi käytössä oleva hätänumero.**

Attention **Le service Voice over IP (VoIP) et le service d'appels d'urgence ne fonctionnent pas en cas de panne de courant. Une fois que le courant est rétabli, vous devrez peut-être réinitialiser ou reconfigurer le système pour accéder de nouveau au service VoIP et à celui des appels d'urgence. Aux États-Unis, le numéro des services d'urgence est le 911. Vous devez connaître le numéro d'appel d'urgence en vigueur dans votre pays.**

Warnung **Bei einem Stromausfall oder eingeschränkter Stromversorgung funktionieren VoIP-Dienst und Notruf nicht. Sobald die Stromversorgung wieder hergestellt ist, müssen Sie möglicherweise die Geräte zurücksetzen oder neu konfigurieren, um den Zugang zu VoIP und Notruf wieder herzustellen. Die Notrufnummer in den USA lautet 911. Wählen Sie im Notfall die für Ihr Land vorgesehene Notrufnummer.**

Avvertenza **Il servizio Voice over IP (VoIP) e il servizio per le chiamate di emergenza non funzionano in caso di interruzione dell'alimentazione. Ristabilita l'alimentazione, potrebbe essere necessario reimpostare o riconfigurare l'attrezzatura per ottenere nuovamente l'accesso al servizio VoIP e al servizio per le chiamate di emergenza. Negli Stati Uniti, il numero di emergenza è 911. Si consiglia di individuare il numero di emergenza del proprio Paese.**

Advarsel **Tjenesten Voice over IP (VoIP) og nødanropstjenesten fungerer ikke ved strømbrudd. Etter at strømmen har kommet tilbake, må du kanskje nullstille eller konfigurere utstyret på nytt for å få tilgang til VoIP og nødanropstjenesten. I USA er dette nødnummeret 911. Du må vite hva nødnummeret er i ditt land.**

Aviso **O serviço Voice over IP (VoIP) e o serviço de chamadas de emergência não funcionam se houver um corte de energia. Depois do fornecimento de energia ser restabelecido, poderá ser necessário reiniciar ou reconfigurar o equipamento para voltar a utilizar os serviços VoIP ou chamadas de emergência. Nos EUA, o número de emergência é o 911. É importante que saiba qual o número de emergência no seu país.**

¡Advertencia! **El servicio de voz sobre IP (VoIP) y el de llamadas de emergencia no funcionan si se interrumpe el suministro de energía. Tras recuperar el suministro es posible que deba que restablecer o volver a configurar el equipo para tener acceso a los servicios de VoIP y de llamadas de emergencia. En Estados Unidos el número de emergencia es el 911. Asegúrese de obtener el número de emergencia en su país.**

Varning! **Tjänsten Voice over IP (VoIP) och larmnummertjänsten fungerar inte vid strömavbrott. Efter att strömmen kommit tillbaka måste du kanske återställa eller konfigurera om utrustningen för att få tillgång till VoIP och larmnummertjänsten. I USA är det här larmnumret 911. Du bör ta reda på det larmnummer som gäller i ditt land.**

Figyelem **Az IP csatornán történő hangátvitel (VoIP) és a segélyhívó szolgáltatás nem működik, ha az áramellátás megszűnik vagy megszakad. Az áramellátás helyreállítását követően előfordulhat, hogy alaphelyzetbe kell állítani vagy újra kell konfigurálni a berendezést, hogy újra hozzáférhessen a VoIP és a segélyhívó szolgáltatáshoz. Az Egyesült Államokban a segélyhívó szám 911. Tisztában kell lennie a saját országának segélyhívó számával.**

Предупреждение **Служба передачи голоса по IP (VoIP) и служба экстренных вызовов не будут работать, если произошел сбой питания. После восстановления питания, возможно, потребуется перенастроить оборудование, чтобы возобновить доступ к службе VoIP и службе экстренных вызовов. В США телефон службы экстренных вызовов 911. Вам необходимо знать телефон этой службы в своей стране.**

警告 如果电源出现故障或中断，您将无法使用 Voice over IP (VoIP) 服务与紧急呼叫服务。电源恢复之后，您可能需要重新设置或重新配置设备，以便重新获得进入 VoIP 与紧急呼叫服务的权限。在美国，此紧急呼叫号码是 911。您必须知道本国的紧急呼叫号码。

警告 電源障害や停電の場合、ボイス オーバー アイピー (VoIP) サービスと緊急呼出しサービスは機能しません。電源の回復後、VoIP と緊急呼出しサービスにアクセスするには機器をリセットまたは再設定する必要があります。米国内の緊急呼出し番号は 911 です。お住まいの地域の緊急呼出し番号をあらかじめ調べておいてください。

Statement 1071—Warning Definition

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus **TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung **WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel **VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

Figyelem **FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmezeto jel veszélyre utal. Sérülésveszélyt rejto helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján keresheto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel VIGTIGE SIKKERHEDSANVISNINGER

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير إرشادات الأمان الهامة

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في أخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز.

قم بحفظ هذه الإرشادات

Upozorenje

VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění

DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση

ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה

הוראות בטיחות חשובות

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כד לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena

ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА
Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.
ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie

WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie

DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Opozorilo

POMEMBNI VARNOSTNI NAPOTKI

Ta opozorilni simbol pomeni nevarnost. Nahajate se v situaciji, kjer lahko pride do telesnih poškodb. Preden pričnete z delom na napravi, se morate zavedati nevarnosti udara električnega toka, ter tudi poznati preventivne ukrepe za preprečevanje takšnih nevarnosti. Uporabite obrazložitveno številko na koncu posameznega opozorila, da najdete opis nevarnosti v priloženem varnostnem priročniku.

SHRANITE TE NAPOTKE!

警告

重要安全性指示
此警告符號代表危險，表示可能造成人身傷害。使用任何設備前，請留心電路相關危險，並熟悉避免意外的標準作法。您可以使用每項警告後的聲明編號，查詢本裝置隨附之安全性警告譯文中的翻譯。
請妥善保留此指示